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ABSTRACT

This curriculum was designed to help teachers teach their fourth-grade students about hearing and the effects of loud noises on hearing. The program describes the human ear and how it works, explains the health effects of noise, and offers ways for students to protect their hearing from unsafe noise levels. Students are taught how hearing is measured, the types and causes of hearing loss, and how to share this knowledge with other students through posters that they have designed. Four classroom sessions are described; overheads for each session are included. Concepts are explained using pictures, diagrams, and games. Children's pre- and post-program questionnaires are included as well as a teacher evaluation form and a letter to parents that explains the program. A hearing fact sheet is appended that offers analysis of the many sounds that surround people in their daily lives. A listing of materials needed for the program is included, such as folders, overhead projector, video machine, radio, anatomical ear model, and earplugs. Curriculum references and sources are listed. (NAV)

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PLAY IT BY EAR

HEARING CONSERVATION CURRICULUM

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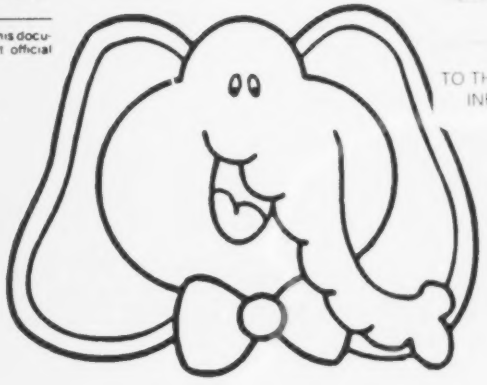

Dianne R. Olson

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ACKNOWLEDGEMENTS

The Play It By Ear Hearing Conservation Program was designed to alert young people to the dangers of loud sound. Much of this curriculum was developed by "pulling together" material which previously existed in this area.

The author wishes to give grateful acknowledgement and recognition to all those cited in the Curriculum References and Sources section of this program; however, the following sources are especially acknowledged for allowing permission to use quoted material noted in the curriculum:

American Speech-Language-Hearing Association
10801 Rockville Pike
Rockville, Maryland 20852-3279

National Information Center on Deafness
Gallaudet University
800 Florida Avenue NE
Washington, DC 20002-3695

For use of: "Have you ever wondered about . . . The Ear and Hearing," Evelyn Cherow, ASHA. Material from this source is designated by a **(1)** following the notation.

Sight & Hearing Association
674 Transfer Road
St. Paul, Minnesota 55114-1402

For use of: "K*now* Noise" Hearing Conservation Program. Material from this source is designated by a **(2)** following the notation.

PLAY IT BY EAR
LEARNER OUTCOMES

* Students will identify the parts of the ear.
* Students will understand the auditory process of hearing.
* Students will recognize the types and causes of hearing loss.
* Students will understand how hearing is measured.
* Students will recognize the health effects of noise.
* Students will explain to others how loud sounds damage their hearing.
* Students will differentiate safe and unsafe noise levels.
* Students will hypothesize ways to protect their hearing.
* Students will design posters to share their knowledge of the dangers of loud sounds with other students.

PLAY IT BY EAR

HEARING CONSERVATION CURRICULUM

SESSION ONE

1. Introduction: Purpose of Unit/Folder - 5 minutes
2. Questionnaire Completed by Students - 10 minutes
3. Sound Versus Noise - 5 minutes
4. Video: "Know Noise" - 15 minutes
5. Anatomy of Ear - 15 minutes
6. Closing: Session One Summary/Questions/Discussion - 5 minutes
7. Assignment: Word Find - 5 minutes

SESSION TWO

1. Introduction: Review of Word Find - 5 minutes
2. Review of Anatomy of Ear - 5 minutes
3. Causes of Hearing Loss - 10 minutes
4. Effects of Noise on Health - 5 minutes
5. Types of Hearing Loss - 15 minutes
6. Explanation of an Audiogram - 5 minutes
7. Demonstration of a Student Hearing Screening - 5 minutes
8. Closing: Session Two Summary/Questions/Discussion - 5 minutes
9. Assignment: Pathways in Your Ear - 5 minutes

PLAY IT BY EAR

HEARING CONSERVATION CURRICULUM

SESSION THREE

1. Introduction: Review of Pathways in Your Ear - 5 minutes
2. Unfair Hearing Test - 10 minutes
3. Misunderstood Phrases - 15 minutes
4. Lip Reading Demonstration - 5 minutes
5. Video: "Stop That Noise" - 15 minutes
6. Closing: Session Three Summary/Questions/Discussion - 5 minutes
7. Assignment: The Sounds Around You - 5 minutes

SESSION FOUR

1. Introduction: Review of The Sounds Around You - 10 minutes
2. Safe/Unsafe Noise Levels - 10 minutes
3. Information/Demonstration of Earplugs - 10 minutes
4. Closing: Session Four Summary/Questions/Discussion - 5 minutes
5. Questionnaire - 15 minutes
6. Assignment: Posters - 10 minutes
7. Parent Letter, Ear Plugs, and Hearing Program Folder Sent Home
8. **Teacher Evaluation of Hearing Conservation Program**

MATERIALS NEEDED FOR CURRICULUM

SESSION 1

Folders with Cover Sheet
Session 1 Student Handouts
Overhead Marking Pens
Video: "Know Noise"

SESSION 2

Session 2 Student Handouts
Anatomical Ear Model
Picture of Heather Whitestone, Miss America, 1994
Audiometer
Overhead Marking Pens
Radio
Cassette Tape: "Examples of Filtered Speech and Music" ("Know Noise")
Cassette Tape Player

SESSION 3

Session 3 Student Handouts
Video: "Stop That Noise"
Cassette Tape: "Unfair Hearing Test" ("Know Noise")
Audio Tape Player
Overhead Marking Pens
Blank Overhead Sheet (Lip Reading Demonstration)

SESSION 4

Session 4 Student Handouts
Sheets of White Tagboard
Overhead Marking Pens
Earplugs

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SESSION 1

PLAY IT BY EAR
HEARING CONSERVATION CURRICULUM

SESSION ONE

1. Introduction: Introduce yourself and the hearing conservation program. Explain the purpose of the unit.

During the next two weeks, we will spend four sessions together talking and learning about the importance of your hearing and how to protect it from the dangers of loud sounds. You may think that you have good hearing and you are probably right about that; however, the four sessions that we'll spend together may alert you to hearing dangers that you aren't aware of. Some of these dangers surround you every day.

* **Overhead: "Play It By Ear" Folder Cover**

Hand out folders. Explain that folders are to be kept in students' desks until the unit is complete, then they will be taken home to share with their families. (If desired, choose a "Paper Crew", a group of 3-4 students who will give handouts to the class for the session. Explain that when you announce "Paper Crew", these students are to come up to receive the handouts for their rows/groups of students.) Give a brief overview of Session One.

Imagine it's morning. You are just beginning to wake up. You're wondering how late it is and if you can stay in bed just a few more minutes...or if it's time for you to get up and get ready for school. You hear the shower running, so someone's already in the bathroom. The dog is scratching on the back door to be let in the house. Someone's opening the front door to get the newspaper, and your clock radio just came on. Upstairs someone is running the hair dryer. All these familiar morning sounds tell you it's time to get up! **(1)**

* **Overhead: "My Morning Sound Map"**

Now imagine that you're walking to school. Your best friend yells to you, "Hey, wait for me!" The school patrol raises her hand and says, "Don't cross the street yet." Suddenly you hear your friend yelling and honking his bike horn signaling you to move aside. But the garbage pickup truck is rumbling slowly down the street and you can't cross to the other side just yet. The crossing guard blows her whistle and waves. Now you can hurry on to school. **(1)**

Overhead off

These many words and sounds signaling warnings, friendship, and daily routine are a natural part of the day for people who hear.

Sounds surround us everyday. We pay attention to some of them - the alarm clock, mom's or dad's call to breakfast, the ringing of the phone, music on the radio, a whispered secret, the bell on the ice cream truck, friends talking at recess, an ambulance siren. Other sounds we may choose to ignore - a neighbor's baby crying across the street, a squirrel running across the roof, birds chirping in the early morning, the scratching of pencils on paper, or cars passing down the street.

Our ears and our brain work together to allow us to hear sound. We choose to pay attention to some sounds, and we ignore others. **(1)**

2. Questionnaire (Use Overheads of Test)

* This won't be graded, but it is very important that you do your best work.

* We will read through this questionnaire together. If some of you want to work ahead, you may do so; however, you will need to sit quietly when you are finished so that you don't disturb those who are still working.

3. Sound Versus Noise

Physically, there is no difference betwen sound and noise. Noise is defined as unwanted sound. It is a matter of personal feeling. A windchime may be a nice sound to one person and an irritating noise to another person at the same time.

Sound has the same effect on the ear whether it is thought to be pleasant or not. Classical music played very loudly will do the same damage to the ear as Metallica or Aerosmith music played at the same volume. **(2)**

4. Video: "Know Noise" (15 minutes)

5. Anatomy of Ear

*** Review Video Information. (Mention speech of person who was signing in the video and why her speech sounded that way.)**

Many people think our ears are just the parts we see attached on the outside of our head. Would you be surprised to learn that the ear actually has three main parts? Let's look at this drawing to learn more about our ears. **(1)**

*** Overhead: Diagram of the Human Ear (Drawing only, No labels)**
Label Parts as They Are Explained

The three parts of the ear are: the outer ear, the middle ear; and the inner ear. First we'll talk about each of the parts of the ear. The outer ear is shaped like a funnel. The part you can see is called the pinna. Inside the outer ear is the ear canal, a tunnel which ends at a round membrane called the eardrum. The eardrum separates the outer ear from the middle ear.

The middle ear is a small air-filled space that is no bigger than an M&M. It contains the Eustachian tube and a bridge of three bones. The Eustachian tube connects your ear and your throat and helps to keep a supply of fresh air in the middle ear. The three bones, called ossicles, are the smallest bones in your body. All are full size at birth and all three together could fit on a penny. Each has a name: malleus or hammer, incus or anvil, and stapes or stirrup.

The bridge of ossicles hangs across the air space in the middle ear. This bridge starts with the malleus which is attached to the eardrum and ends with the stapes which is attached to the oval window, another kind of eardrum.

The inner ear is the organ in our body responsible for hearing and balance. In the inner ear we find the cochlea. It is about the size of a pencil eraser. The cochlea, which is spiral-shaped like a snail's shell, is made of three coils of bone. The coils are filled with special liquid. Inside the cochlea are 15,000 to 20,000 tiny hair cells called cilia. These cells connect to nerve fibers that make up the auditory nerve. The nerve of hearing is also called the eighth nerve in our body.

Each part of the ear has a special role to play in the hearing process. It's a process that begins only when sound reaches the ear.

Sound is created when an object vibrates or moves back and forth, pushing the air around it. The sound of thunder on a stormy night or the song on a music box sets the air in motion until the air molecules closest to you begin the journey through your ear and up to your brain.

Think of a sound. Let's follow what happens when the sound moves through each of the parts of your ear until you "hear" it. **(1)**

* **Overhead: Sound Moving Through Diagram of the Human Ear**

The pinna of the outer ear works like a baseball catcher's mitt to "catch" the sound waves and direct them down through the ear canal to the eardrum. The eardrum vibrates with the rhythm of the sound waves pushing aginst it.

As the sound waves move the eardrum, the bridge of three ossicles vibrates back and forth. This vibration moves the oval window, carrying the rhythm of your favorite sound into the inner ear.

When the sound waves move the inner ear fluid, the hair cells float in rhythm like a boat on the water. Next the hair or cilia on top of the cell bend. This bending sends patterns of electrical signals through the nerve fibers of the nerve of hearing. A loud sound moves the hair cells much more than a soft sound. High pitch sounds, such as whistles or the speech sounds /t/ or /s/, cause a movement of the membrane and hair cells in a different place than low pitch sounds like drums or vowel sounds.

The electrical signals travel from the hair cells to the nerve of hearing up to the brain. The brain makes sense of the electrical patterns sent across the nerves and you "hear" your sound.

The ear is not just for hearing. Some parts have other functions as well. Wax in your ear canal protects the other parts of the ear from dirt and bugs. But, too much wax in your ear canal can block sound from traveling further, cause you to hear less, and might require some attention from your doctor.

Have you noticed that your ears sometimes tickle or hurt when you have a cold? The Eustachian tube makes it possible for a cold to cause this discomfort. It's through this passageway that cold germs travel from your nose and throat to your ears. The Eustachian tube has another helpful function: it can clear your ears when you yawn or swallow.

If you've ever had an ear infection, you may have noticed that you didn't hear as well. This change in hearing happens when the space in the middle ear fills with liquid. The liquid keeps the eardrum and ossicles from moving freely, and thus your hearing may change. After you take some medicine, the liquid usually dries up, and your middle ear parts are again set in motion by sound.

Have you ever visited Valley Fair and gone on a ride that spins you around fast? If you have, you probably know what it feels like to be dizzy. Maybe you even closed your eyes so that you would feel less dizzy. Let's find out why. **(1)**

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Two other parts of your inner ear, the semicircular canals and the vestibule, have nothing to do with hearing. These two parts of the inner ear provide information to the brain about your balance and the position of your body in space.

As you turn your body and head, different hair cells in the vestibule and semicircular canals change direction. When this happens, electrical signals are sent through the nerve fibers which connect to your eye muscles. Your eyes move in different directions depending on how your body is twisting and turning. These signals send information to the brain that lets you know if you are standing on your head, doing a somersault, or simply jumping rope. **(1)**

6. Closing: Summarize Session One, Questions/Discussion.

7. Assignment: Word Find Handout.

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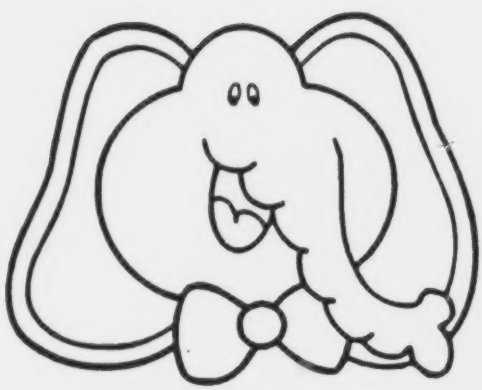
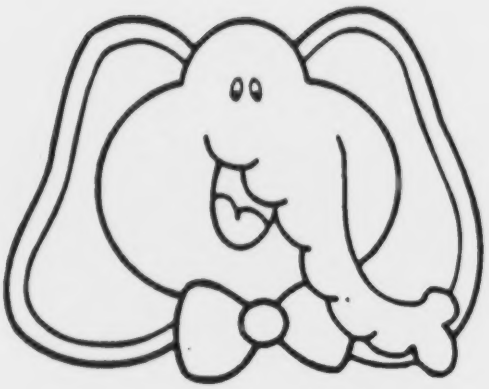
OVERHEADS

SESSION ONE



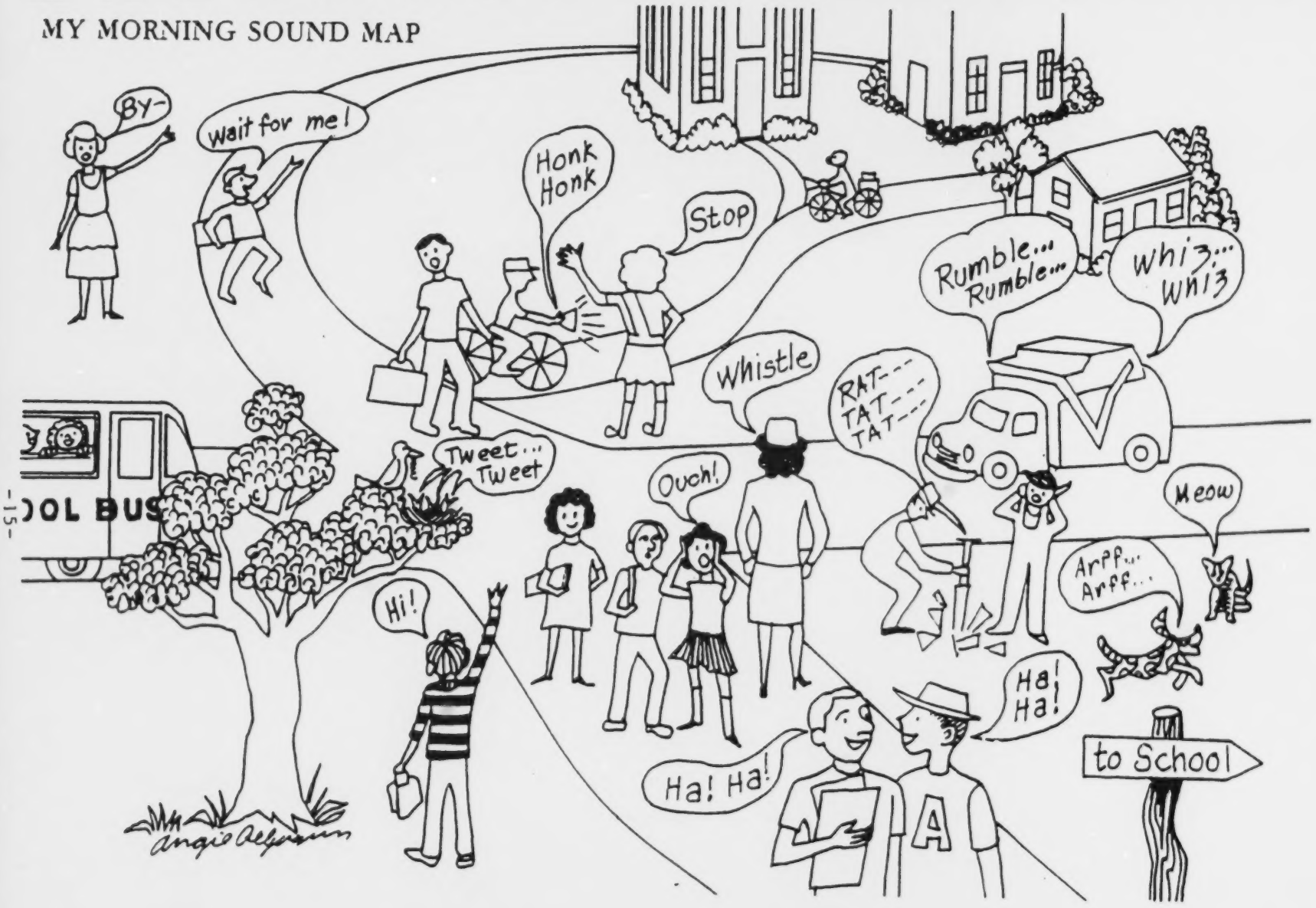
PLAY IT

BY EAR



NAME _____

MY MORNING SOUND MAP



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CRESTVIEW ELEMENTARY SCHOOL
PRE-PROGRAM HEARING QUESTIONNAIRE

NAME: _____

AGE: _____ **MALE ( ) FEMALE ( )**

DATE: _____

EXPOSURE TO NOISE

1. Do you think you have normal hearing? YES ( ) NO ( )
2. Do family members tell you that you have the TV set volume too loud?

   NEVER ( ) SOMETIMES ( ) OFTEN ( )
3. Do you listen to a stereo system (a "box") with the volume on loud?

   NEVER ( ) SOMETIMES ( ) OFTEN ( )
4. Do you use a stereo/box with earphones? YES ( ) NO ( )
5. Do you use a "walkman" with headphones? YES ( ) NO ( )
6. Have you ever attended a rock concert? YES ( ) NO ( )
7. Have you ever:

   Ridden a Snowmobile? YES ( ) NO ( )

   Ridden a Motorcycle? YES ( ) NO ( )

   Ridden a Jet Ski? YES ( ) NO ( )

   Used a Power Lawn Mower? YES ( ) NO ( )

   Used Firearms (Rifle, Pistol, Etc.)? YES ( ) NO ( )

   Used a Snowblower? YES ( ) NO ( )

   Been Near or Used Firecrackers? YES ( ) NO ( )

PRE-PROGRAM QUESTIONNAIRE
PAGE TWO (2)

8. Do you ever wear earplugs to protect your hearing? YES ( ) NO ( )

   If yes, for which activities do you wear earplugs? _____

   _____

9. Have you ever been told that noise can damage (hurt) your hearing?

   YES ( ) NO ( )

10. Do you think music should be loud to be fully enjoyed? YES ( ) NO ( )

KNOWLEDGE OF HEARING AND HEARING LOSS

Circle the letter "T" if the statement is "True" or "F" if the statement is "False".

T F 1. A good way to protect your hearing from loud sounds is to put cotton in your ears.

T F 2. Hearing loss caused by too much loud noise can usually be corrected by a doctor's care.

T F 3. The volume of your "walkman" is too loud if someone next to you can hear the sound.

T F 4. One way to protect your hearing at a rock concert is to take a break in the lobby.

T F 5. A hearing aid returns hearing to normal just as eyeglasses return vision to normal.

T F 6. Ears can be "toughened up" against noise by increasing the volume levels on your stereo, "walkman", and TV set a little bit at a time.

T F 7. Loud noises can cause ringing in the ears.

T F 8. All words can be easily lipread by a person who has been trained to watch lips.

T F 9. Hearing loss caused by too much loud noise is always noticed immediately.

PRE-PROGRAM QUESTIONNAIRE
PAGE THREE (3)

T F 10. The damage done by noise depends only on the loudness of the noise.

T F 11. The part of your ear that is hurt by noise is the eardrum.

T F 12. Rock music players never wear hearing protection because they would have trouble hearing other band members.

T F 13. Almost everyone in the United States loses some hearing as they get older.

T F 14. The government requires hearing protection for some workers.

T F 15. The loudness of sound is usually measured in units called decibels.

T F 16. The inner ear controls our balance.

T F 17. The person who studies and tests hearing is an optometrist.

T F 18. Most hearing loss caused by too much noise can be prevented.

T F 19. Some animals can hear sounds that humans cannot hear.

T F 20. A machine used to test hearing is a sound meter.

PLAY IT BY EAR

KNOWLEDGE OF HEARING AND HEARING LOSS

QUESTIONNAIRE ANSWER KEY

T **F** 1. A good way to protect your hearing from loud sounds is to put cotton in your ears.

T **F** 2. Hearing loss caused by too much loud noise can usually be corrected by a doctor's care.

T F 3. The volume of your "walkman" is too loud if someone next to you can hear the sound.

T F 4. One way to protect your hearing at a rock concert is to take a break in the lobby.

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PLAY IT BY EAR
KNOWLEDGE OF HEARING AND HEARING LOSS
QUESTIONNAIRE ANSWER KEY
PAGE TWO

T F 15. The loudness of sound is usually measured in units called decibels.

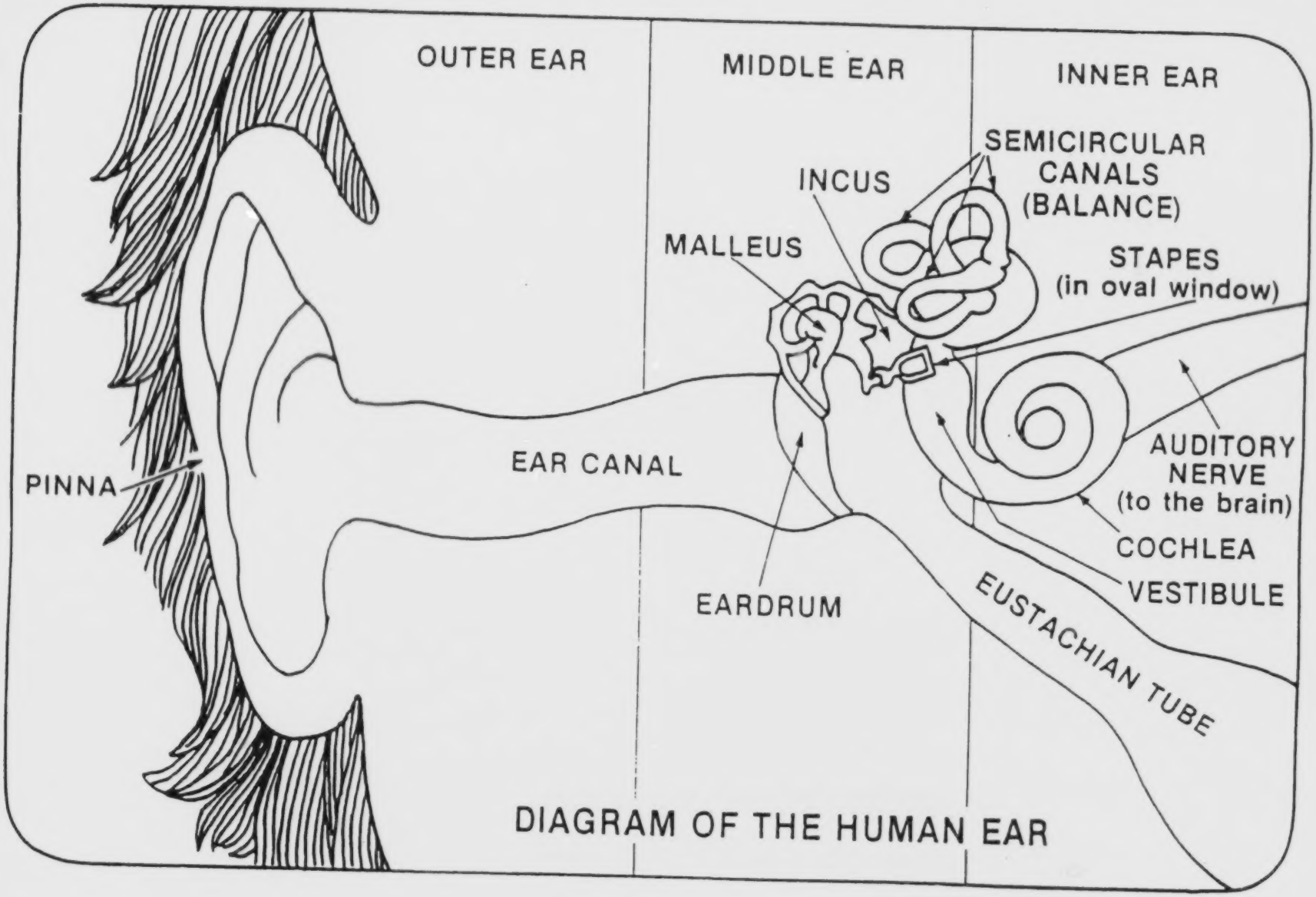
T F 16. The inner ear controls our balance.

T **F** 17. The person who studies and tests hearing is an optometrist.

T F 18. Most hearing loss caused by too much noise can be prevented.

T F 19. Some animals can hear sounds that humans cannot hear.

T **F** 20. A machine used to test hearing is a sound meter.



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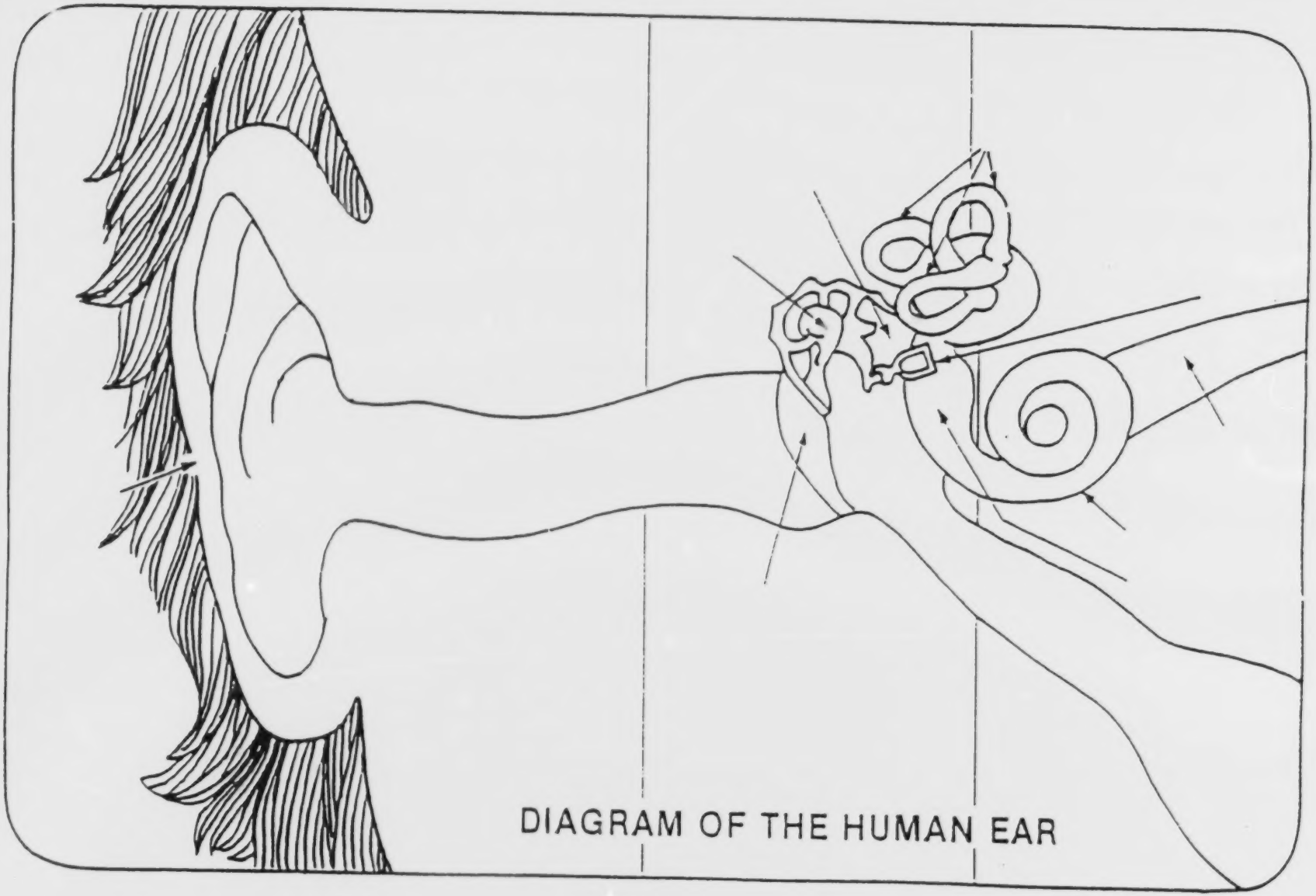

DIAGRAM OF THE HUMAN EAR

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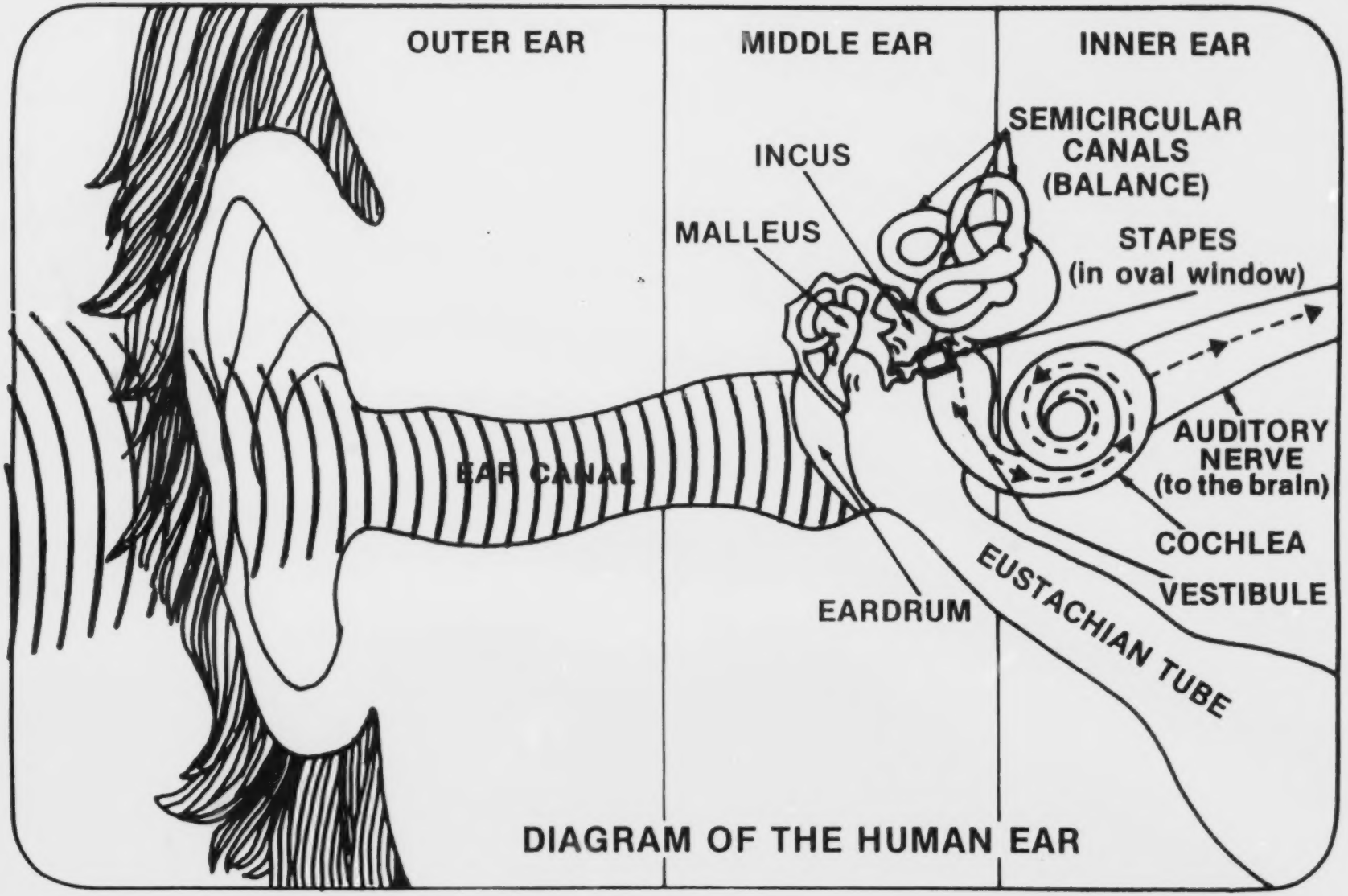

DIAGRAM OF THE HUMAN EAR

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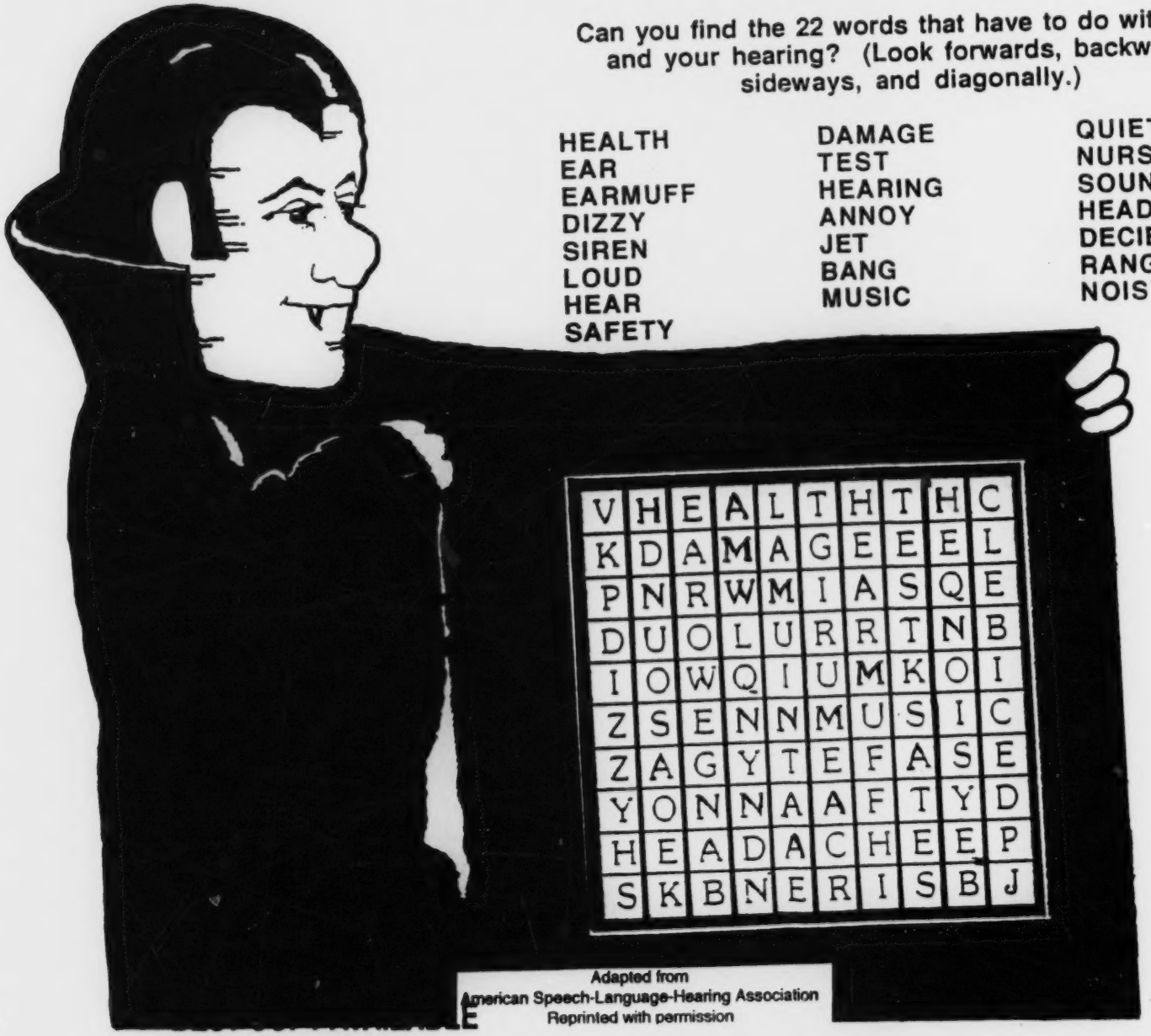
CATCH 22

Can you find the 22 words that have to do with noise and your hearing? (Look forwards, backwards, sideways, and diagonally.)

HEALTH
EAR
EARMUFF
DIZZY
SIREN
LOUD
HEAR
SAFETY
DAMAGE
TEST
HEARING
ANNOY
JET
BANG
MUSIC
QUIET
NURSE
SOUND
HEADACHE
DECIBEL
RANG
NOISY



V	H	E	A	L	T	H	T	H	C
K	D	A	M	A	G	E	E	E	L
P	N	R	W	M	I	A	S	Q	E
D	U	O	L	U	R	R	T	N	B
I	O	W	Q	I	U	M	K	O	I
Z	S	E	N	N	M	U	S	I	C
Z	A	G	Y	T	E	F	A	S	E
Y	O	N	N	A	A	F	T	Y	D
H	E	A	D	A	C	H	E	E	P
S	K	B	N	E	R	I	S	B	J

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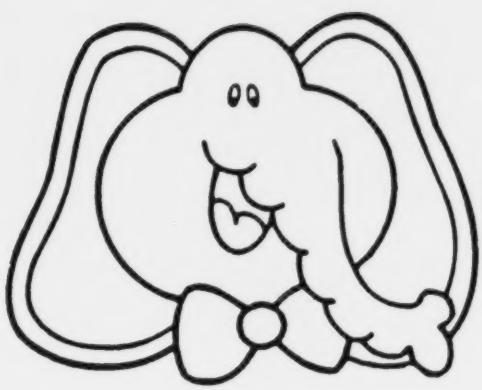
SESSION 2



HEARING CONSERVATION CURRICULUM

SESSION TWO

1. Review of Word Find (Session One). Use Overhead of Completed Word Find

2. Review of Anatomy of Ear (Anatomical Model and Blank Overhead)

3. Causes of Hearing Loss (Overhead)

Do you know a friend, relative, or neighbor who has difficulty hearing? Have you wondered why that person has a hearing problem? Sometimes a person's hearing problem is only temporary - it lasts a short time. Other times the loss is permanent - it will remain the same or maybe become worse.

Not all hearing problems are the same. Hearing loss is caused because of damage to one or more parts of the ear. How does this damage happen?

* **Before Birth:** Ear damage may happen before birth. When a baby is forming in its mother, several things can happen which change the development of the baby's ear. A mother can become ill with a virus that damages the baby's ear. German measles is one type of virus known to cause damage to the hair cells of the inner ear. Some parts of a baby's ear may not form correctly; an outer or middle ear may not develop at all.

* **Inherited:** We inherit hair color and eye color from parents. Your particular hair color may go back to a grandparent. In a similar way, some children or adults may inherit a hearing loss because their father, mother, or other close relative may have a hearing loss.

* **Serious Illness:** Serious illness can cause damage to the delicate parts of the inner ear. Mumps and meningitis, for example, are illnesses that may cause permanent hearing loss.

* **Medication:** At times doctors need to make difficult decisions in order to save a sick person's life. Some life-saving drugs can cause permanent damage to ears. Doctors ony choose to use this kind of medicine if someone is very ill. **(Discuss current Ms. America.)**

* **Accidents:** Accidents to the head can also damage the ear. A hard blow to the head can crack the bone of the inner ear or break the ossicles. **(1)**

* **Noise:** Noises can damage hearing, too. The loss can be temporary or permanent. Exploding a firecracker close to the head, playing loud music, shooting guns or cap pistols, and working with power tools for long periods of time again and again can damage the inner ear. Noise can even cause a permanent, annoying ringing sound in the ear. Hearing loss caused by noise is painless, gradual, and cannot be "fixed". It happens little by little and it cannot be felt. By the time people notice their hearing has been damaged, nothing can be done to return it to its original condition.

Do you enjoy listening to music through headsets on a portable radio/cassette player? Worn at loud sound levels for several hours, these devices can also cause hearing problems.

Age: Many older people, maybe even your grandmother or grandfather or a great aunt or uncle, have hearing problems. These problems may be caused by noise, medicine, accident, illness, or even by getting older. Almost everyone in the United States loses some hearing as they age. Just like our eyes, some parts of the ear can wear out as we age, but, if protected against loud sounds, good hearing can last a person's entire lifetime. **(1)**

4. Effects of Noise on Health (Overhead)

5. Types of Hearing Loss (Audio Tape: "Examples of Filtered Speech and Music," Tape Recorder, Radio)

*** Overhead: Types of Hearing Loss**

Conductive hearing loss occurs when something interferes with the transfer of sound through the ear, such as damage to the ear drum, hammer, anvil or stirrup. A conductive hearing loss is perceived as a decrease in the volume of sound. This can usually be repaired medically or surgically, or helped significantly by using hearing aids. **(2)**

Use a radio and turn the volume down. Tell the class that this is what a conductive loss is like.

*** Overheads "Loudness" and "Clearness".**

Show the overhead of Loudness and ask what it says. The class should be able to read this clearly. Then show class Clearness and ask what it says. The class will have difficulty reading this word. Connect the letters so the word is legible. Ask why students could not read Clearness, even though it was bigger than Loudness. (The reason: Parts of the word are missing.) Explain that this is similar to how words sound when the hair cells of the inner ear are damaged. Parts of the words do not get through to the brain. To make this more realistic, move the overhead out of focus and explain that hearing can become unfocused when people have damaged their hearing by being exposed to too much sound. (2)

Sensorineural hearing loss occurs when something interferes with the ear's ability to send signals to the brain, such as when the hair cells of the inner ear are damaged. This is perceived as a loss of clearness of sound, but not necessarily a decrease in volume. Sensorineural hearing loss is usually permanent and cannot be cured. **(2)**

Use a radio and set it between stations. Tell the class that this is what a sensorineural loss is like.

Play tape. Explain that this is how things sound to people with a hearing loss. Explain and demonstrate that simply turning up the volume (which is what a hearing aid does) does not help completely. The key difference is loss of clearness of the sound.

Cup your hands around your mouth and speak to the class. Explain to them that this is how things sound to people who have damaged their hearing by being exposed to too much sound. Continue speaking, and slowly close the cup of your hands around your mouth so that the sound becomes distorted. (2)

Mixed hearing loss is a combination of conductive and sensorineural hearing loss. **(2)**

* **Overhead of Foot Walking on Grass (Explain relation to cilia. Refer to "Know Noise" Video.)**

* **Overhead of Damaged Cilia Picture**

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Too much exposure to loud sound causes sensorineural hearing loss which cannot be repaired. A hearing aid will provide help for remaining hearing, but cannot replace the damaged hair cells. Hearing aids only work with whatever hearing a person has left. They cannot restore damaged hearing to normal. They can help with understanding of speech and can improve clearness of sound, but they do not return hearing to normal in the same way eyeglasses can correct your vision.

David Hawley is a staff writer for the St. Paul Pioneer Press, a local newspaper. He is 48 years old and recently, he wrote about getting hearing aids for both ears. He had a lot of ear problems at a young age and fired a lot of guns in the war. He said:

"Hearing aids do more than amplify (make louder) sound. They also change the quality of the sound you hear. They may be wonders of technology, but they don't even come close to the wonder of nature that most of us enjoy from birth. And hearing aids can be really annoying. On a breezy day, your upwind ear can sound like an obscene breather has his chin resting on your shoulder. Until you get used to it, your own voice sounds weird, like you're holding your nose. Chewing something crunchy makes you feel like your head has been jammed into a trash compactor. With some hearing instruments, you may have to learn a new way to use the telephone. My first set of instruments picked up too many high tones. The sound of high heels walking on concrete felt like nails being pounded into my head" (D. Hawley, St. Paul Pioneer Press, October 6, 1994).

6. Explanation of an Audiogram (Need Audiometer)

When you have your hearing tested, someone will use an audiometer. **(Explain word in two parts: "audio" means "sound" and meter means a "measure of")** The audiologist **(Explain word in two parts: "audio" means "sound" and last portion means "one who measures")** will ask you to put on headphones and then listen for some different tones. Some are high-pitched; some are low-pitched. Some are loud; some are very very soft. You push a button or raise your hand to let the audiologist know when you just barely hear each tone. As you respond to each tone, the audiologist will mark a special form called an audiogram. **(Explain word in two parts: "audio" means "sound" and "gram" is a "measure of".)** This form shows how softly you are able to hear each tone. **(1)**

*** Overhead of Blank Audiogram**

The completed audiogram is a picture of how you responded to all the tones. The numbers you see across the top of the sample audiogram represent the pure-tone frequencies - 125 through 8000 Hertz (Hz) - used to test hearing. The numbers tell something about these tones. As the numbers become larger, the pitch of the tones becomes higher. Along the left-hand side of the audiogram you see the numbers 0 to 120. These numbers tell how loud the sound is when you respond to a specific tone. The unit used to describe the loudness of sound is the decibel (dB). Normal hearing is usually from 0 to 20 dB. As the numbers go from 10 to 20 to 30, the sound becomes louder. So, the higher the number of decibels when a person first responds to the tone sounds, the greater a person's temporary or permanent hearing loss may be. **(2)**

7. Demonstration of a Student Hearing Screening (Audiometer). Use blank overhead to record screening results and share with class.

*** Overhead/Handout of Audiogram With Pictures/Phonemes**

To help you understand just how loud certain sounds are, look at this audiogram. The drawings show the loudness and frequencies of speech and other everyday sounds. A ticking watch is a high frequency sound (2000 Hz). It's louder than a whisper. The speech sounds fall in different places on the audiogram. You can imagine how hard it might be to hear certain words correctly if you couldn't hear some of the sounds. The shaded area on the audiogram shows a high frequency hearing loss. Take away those few speech sounds (f, s, th, k) and you'd have a hard time telling the difference between "feel" and "seal". And think of the confusion you'd have with "shoes" and "choose" or "sat" and "cat". These are just a few examples of the difficulty you would have with a relatively mild loss.

The sound of two people talking is around 60 dB. With a high frequency loss like the one shown, it would be difficult to understand everything they are saying in a conversation.

Other sounds may not communicate information, but they are part of our everyday lives. The sound of a baby crying is louder than conversational speech but softer than a dog's bark, as you might have guessed. Sounds like a power lawn mower or a rock band or a jet plane are much louder. Sometimes sound becomes so loud it can actually be painful for you, and you might cover your ears for protection. **(1)**

Many animals can hear sounds that humans cannot hear.
Elephants can hear very low notes that we cannot hear, while bats, dogs, porpoises, and moths can hear sounds far too high-pitched for us to detect.

*** Overhead of Audiogram With Pictures With Side Information. Explain time limits of sound levels.**

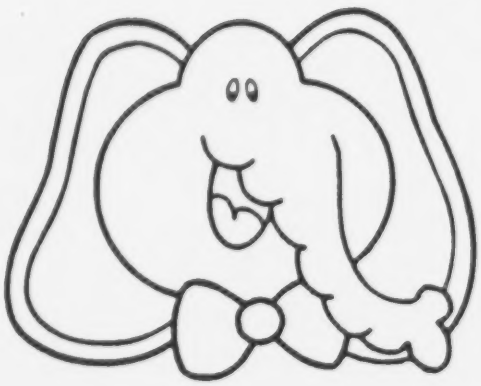
8. Closing: Summarize Session Two, Questions/Discussion

9. Assignment: Pathways in Your Ear

PLAY IT BY EAR

OVERHEADS

SESSION TWO



HEALTH
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NURSE
EARMUFF
HEARING
SOUND
DIZZY
ANNOY
HEADACHE
SIREN
JET
DECIBEL
LOUD
BANG
RANG
SAFETY
MUSIC
HEAR
NOISY

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Z	S	E	N	N	M	U	S	I	C
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Y	O	N	N	A	A	F	T	Y	D
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S	K	B	N	E	R	I	S	B	J

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HEALTH
DAMAGE
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NOISY

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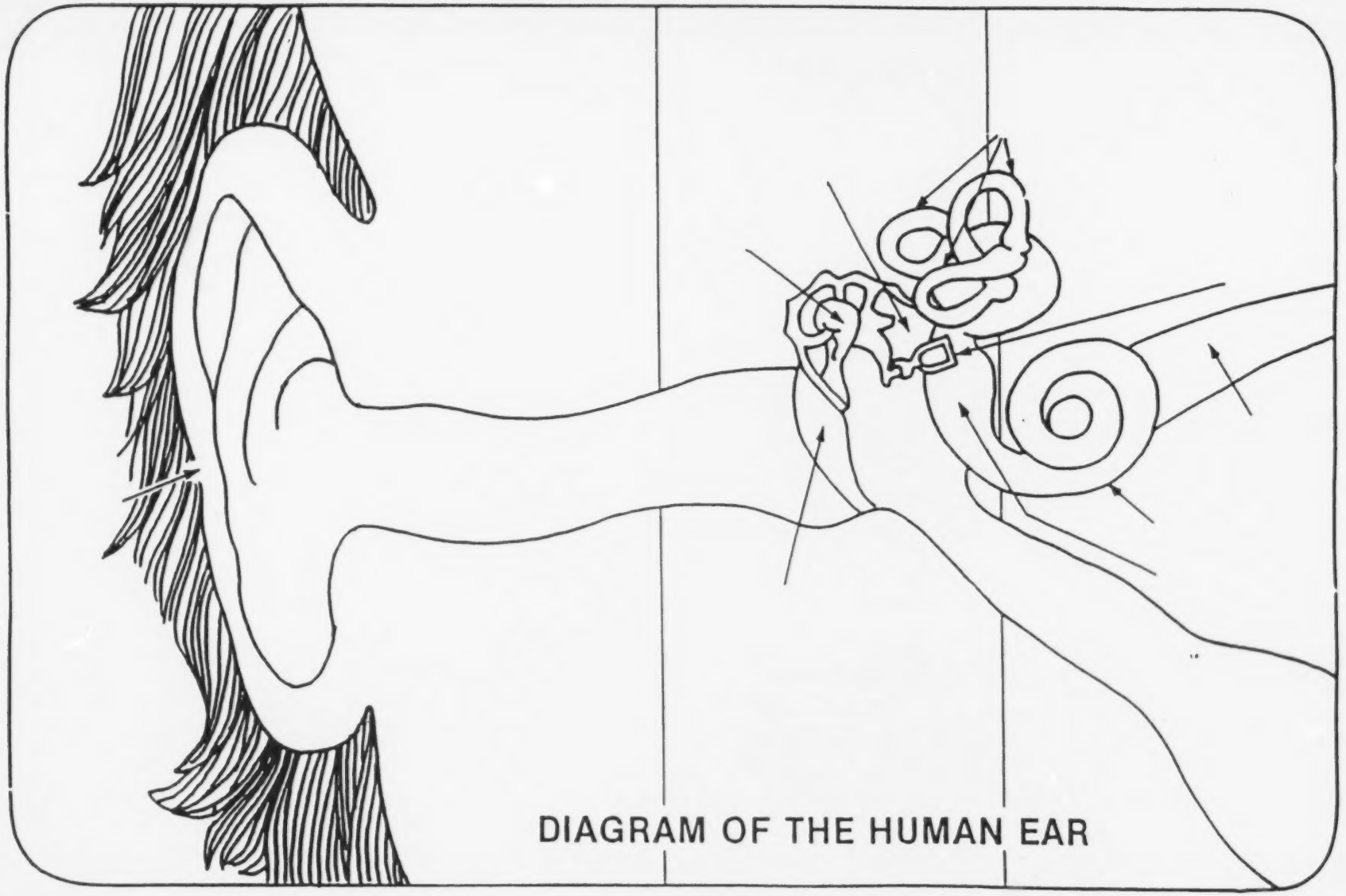

DIAGRAM OF THE HUMAN EAR

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CAUSES OF HEARING LOSS

* BEFORE BIRTH
* INHERITED
* SERIOUS ILLNESS
* MEDICATION
* ACCIDENTS
* NOISE
* AGE

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EFFECTS OF NOISE ON HEALTH AND SAFETY

1. NOISE CAN INTERRUPT SLEEP

2. NOISE CAN STARTLE

3. NOISE CAN INCREASE STRESS LEVELS

4. NOISE CAN AFFECT CONCENTRATION

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TYPES OF HEARING LOSS

1. CONDUCTIVE

2. SENSORINEURAL

3. MIXED

LOUDNESS

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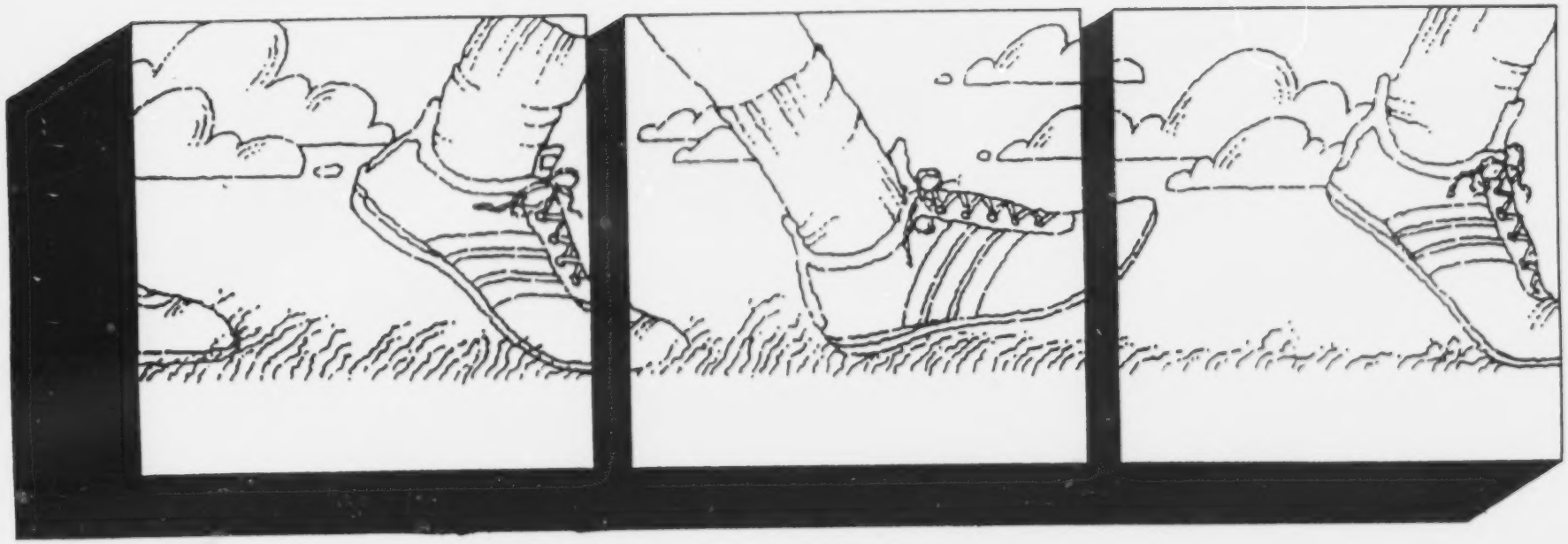

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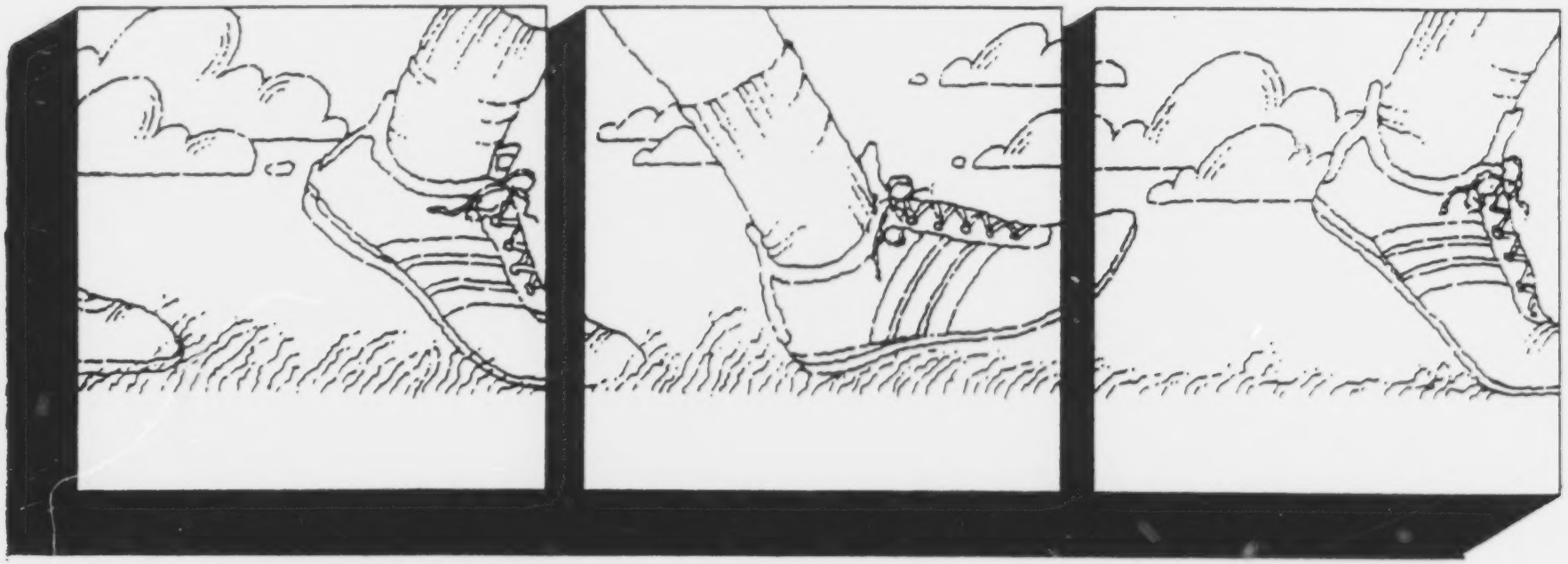
When you listen to sounds that are too loud for a long time they may damage the hair cells in the inner ear.

It's sort of like walking on grass over and over again. At first, the blades of grass just bend and then spring back. But . . .

. . . if walked on constantly, the blades of grass no longer spring back. They turn yellow and die.



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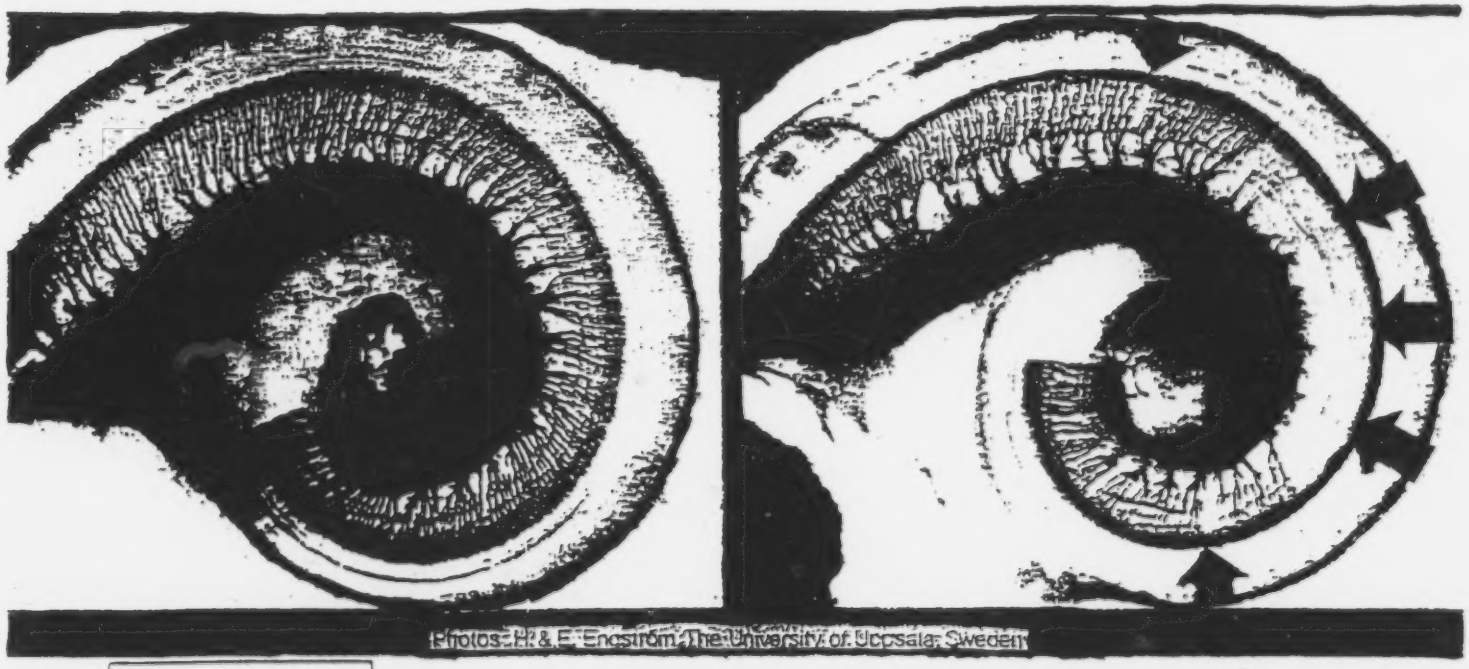
NORMAL

A section of the approximately 40,000 hairlike sensory fibers of the inner ear. All the sensory fibers are intact, and the hearing function is normal.

NOISE DAMAGED

A section of an inner ear which has been damaged by excessive noise. The sensory fibers have been irrevocably destroyed, resulting in a permanent hearing loss.



Photos: U. & E. Engstrom, The University of Uppsala, Sweden

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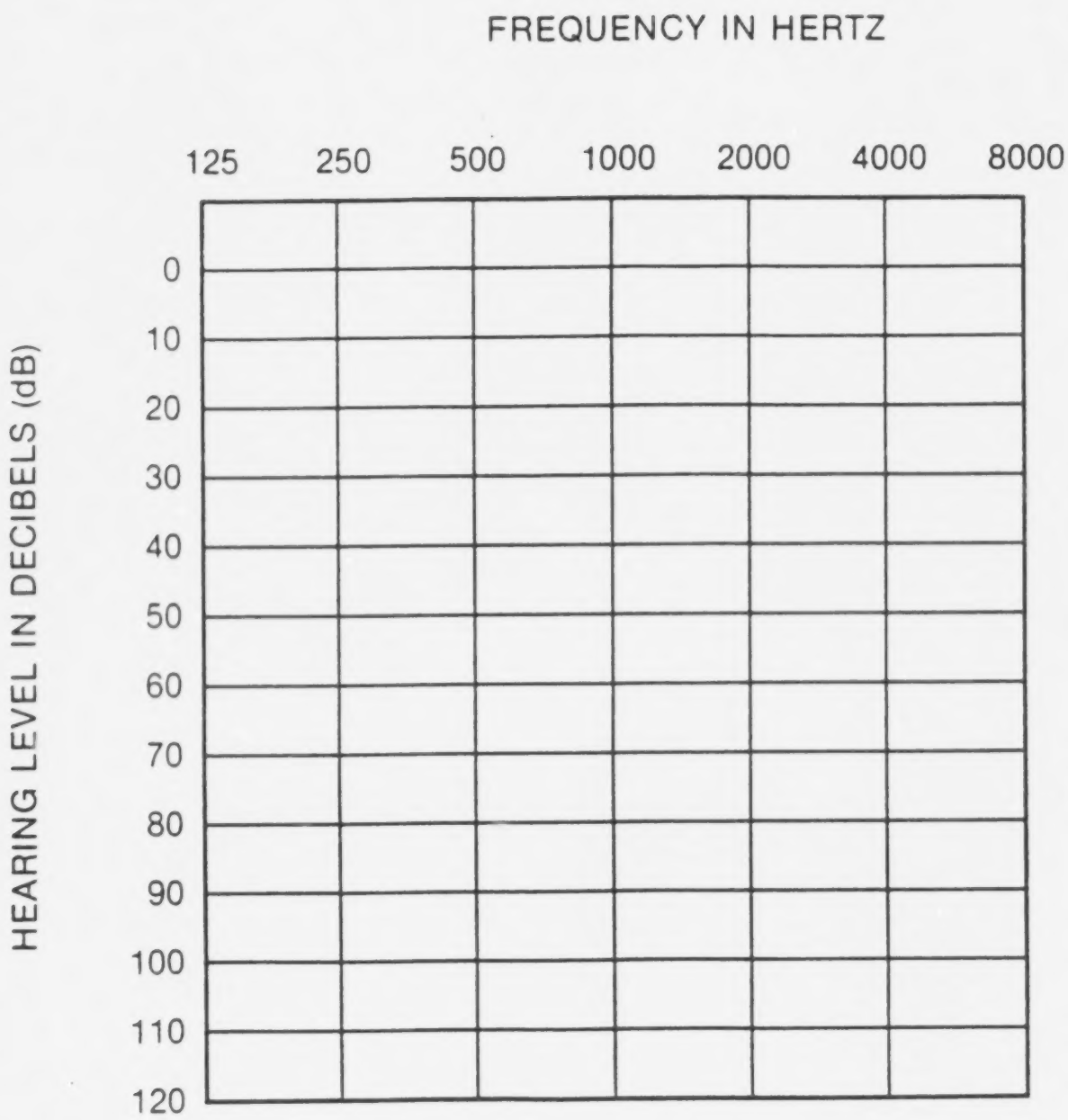
PURE TONE AUDIOGRAM



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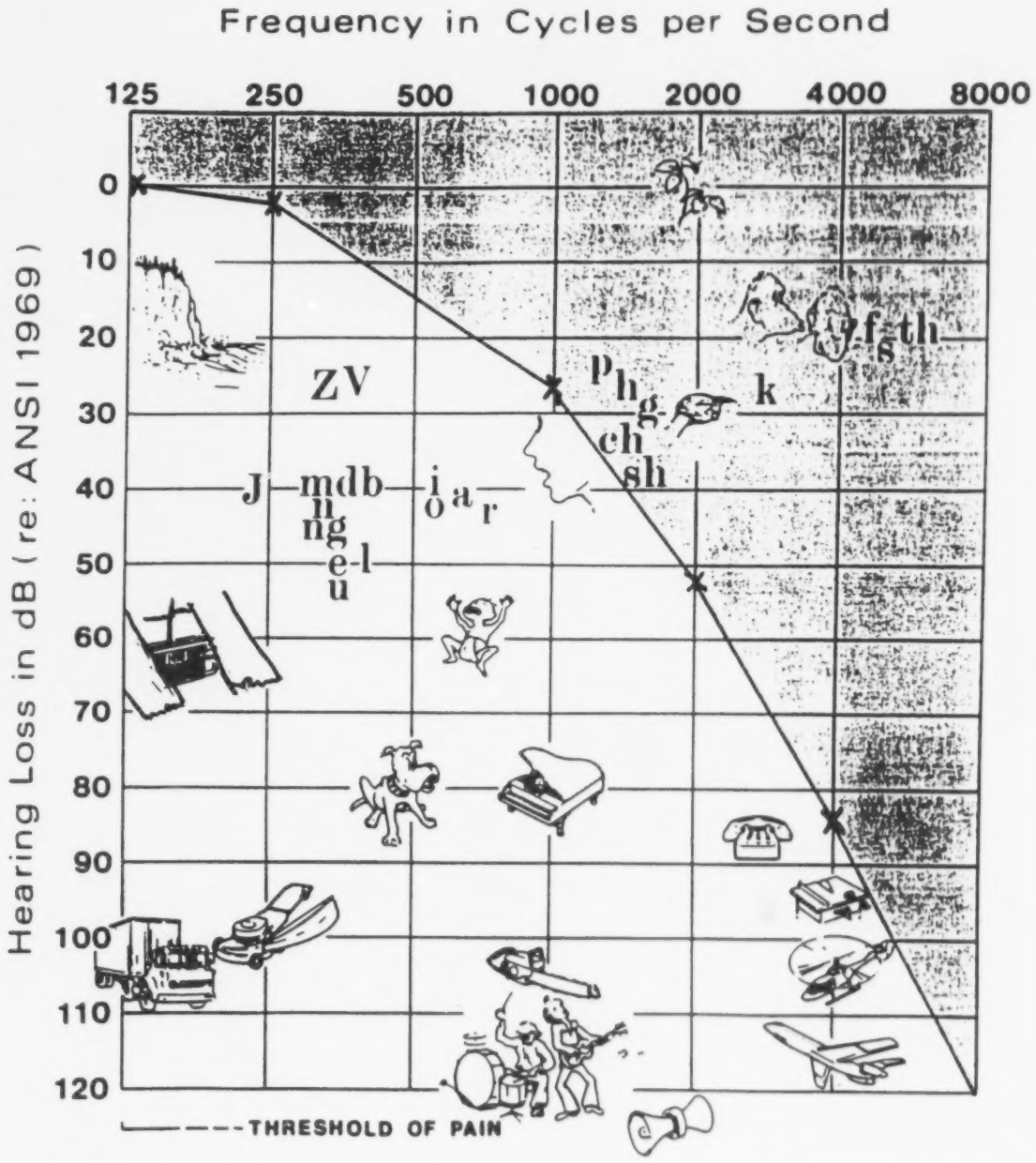

Northern: Hearing In Children, 4th Edition, Williams & Wilkins, 1991 Figure 1 9
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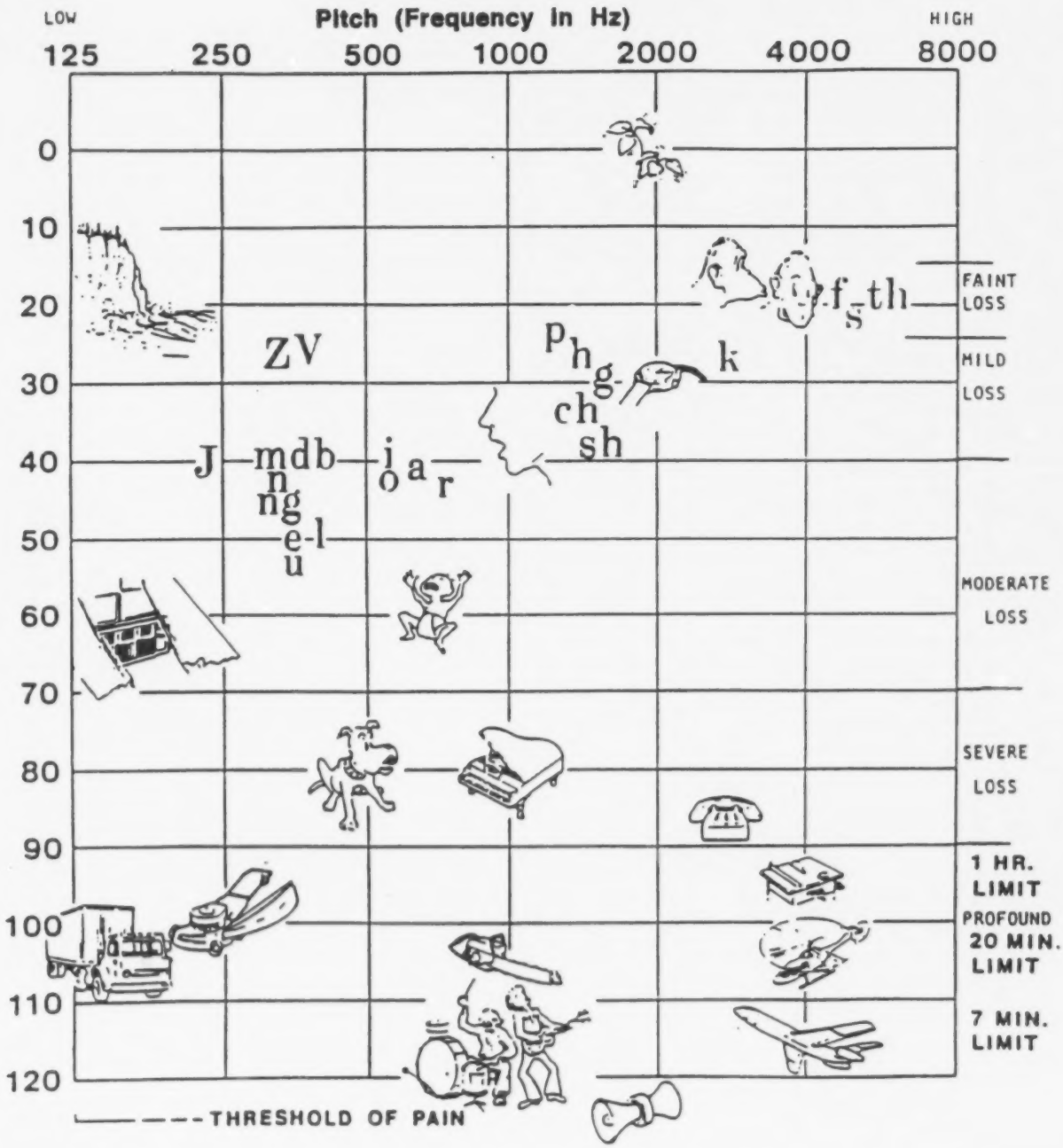
RELATIONSHIP OF SPEECH AND FAMILIAR SOUNDS

TO THE AUDIOGRAM



Northern: Hearing In Children, 4th Edition, Williams & Wilkins, 1991 Figure 1.9
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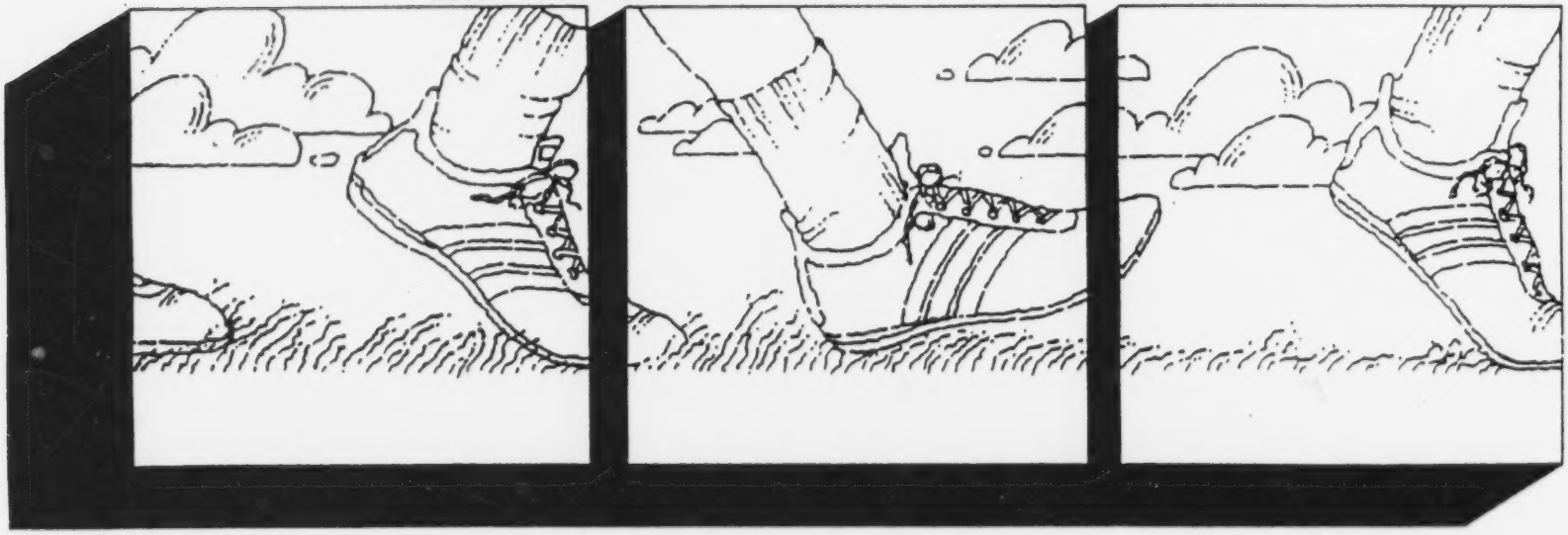
PATHWAYS IN YOUR EAR

Demonstrate your understanding of why loud sound levels may be dangerous to your hearing. Use the pictures below to help you to explain to someone what happens to hair cells in the inner ear when you listen to sounds that are too loud for a long time.



MY NAME: _____

PERSON I EXPLAINED THE PICTURES TO:

_____
(Signature)

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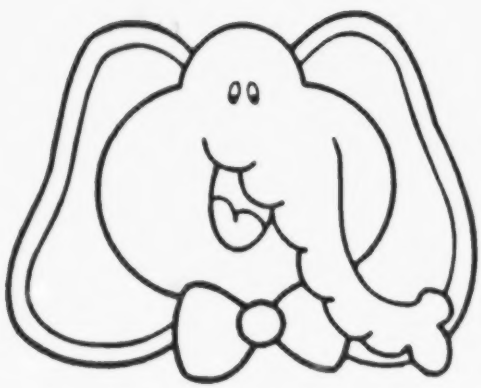
PLAY IT BY EAR

SESSION 3



HEARING CONSERVATION CURRICULUM

SESSION THREE

1. Introduction: Review of Assignment (Session Two)

2. Unfair Hearing Test (Audio Tape: "Unfair Hearing Test," Overhead)

Have class use the blank test form. Play test. Ask for a show of hands on how the class performed. Explain to the class that they had only one word to listen to at a time. It is far more difficult to understand when there are more words and they come much faster.

Ask the class if they have ever played the Telephone Game at a party. In this game, one person whispers a message to someone else, who then whispers the message to someone else, and so forth. When the last person says what they heard, it is usually not exactly the same as it began.

Explain how people with a hearing loss often misunderstand what people tell them. One consequence is that they may pass that mistaken information along to other people. (2)

* **Overhead: How Hearing Loss can Lead to Misunderstanding**

3. Misunderstood Phrases

People with a hearing loss hear parts of the words, but not the entire word. Their brains must then fill in the blanks, but sometimes they fill in the blanks incorrectly.

People with a hearing loss may begin to stay away from other people because they cannot understand and follow along in a conversation. This may lead the person with a hearing loss to feel isolated (all alone).

Hearing loss can also make relations with friends and family difficult because the person has difficulty understanding others and is frustrated. Others also are frustrated by having to speak up and/or repeat themselves.

Other problems that can be caused by a hearing loss include:

* Difficulties in employment, especially if the job requires a lot of spoken communication.

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* Personal risk, if warning sounds such as sirens, car horns, or approaching footsteps cannot be heard.

* Negative perception and/or evaluation by others. People with a hearing loss often are accused of not paying attention, being "stuck up" or distant, or being unintelligent, mentally retarded, even senile, because they misunderstand speech and give inappropriate answers. **(2)**

* **Overhead: Familiar Sayings**

Have the students guess what each familiar saying is. Give the students a copy of the sayings with the correct translation listed on the back side of the sheet. Have the students "quiz" someone at home with the sayings.

4. **Lip Reading Demonstration**

Write the words "Pell, Bell, Mell" on the board/overhead. Use words "Pell, Bell, Mell" in different word order. Have students guess correct order. Tell them that even the very best lip readers are only able to read 30% of speech using lip reading because so many sounds look the same on our lips.

* **Handout: Tips for Communicating With People Who Are Hard-of-Hearing.**

5. **Video: "Stop That Noise"**

6. **Closing: Summarize Session Three, Questions/Discussion**

7. **Assignment: The Sounds Around You (This is most effective if you enlarge the picture to poster-size.)**

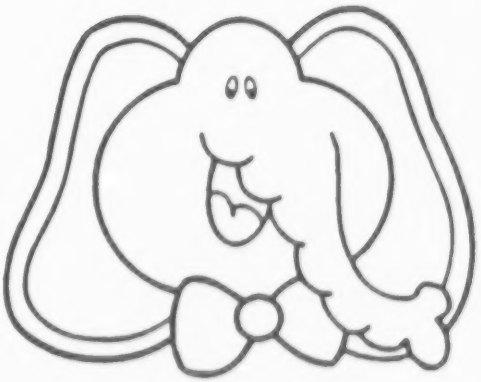
Explain that there are many sounds around us in our everyday activities. Some of these sounds are pleasant and some are unpleasant. Some sounds are soft and some are loud. Tell the class that they will sign up and work in groups to listen for the sounds that surround them in their school.

List school areas (Recess/Playground, Lunchroom, Classroom, On the Bus, Gym, Computer Room, Library, Music, Hallway, Office) on chalkboard that groups of students are to sign up for. They are to draw and/or write words to list the sounds they heard in each area on the worksheet provided. (They should listen for about five minutes.)

PLAY IT BY EAR

OVERHEADS

SESSION THREE



UNFAIR HEARING TEST

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

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UNFAIR HEARING TEST ANSWERS

1. FILL
2. CATCH
3. THUMB
4. HEAP
5. WISE
6. WEDGE
7. FISH
8. SHOWS
9. DEAD
10. TOOTH

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HOW HEARING LOSS CAN LEAD TO MISUNDERSTANDING

How Speech Sounds To Someone With A Sensorineural Hearing Loss

1. Normal Hearing:

   FREDDIE THOUGHT HE SHOULD FIND A THISTLE.

2. Hard-of-Hearing/Noise-induced Hearing Loss:

   REDDIE OUGH E SHOULD IND A ISTLE.

3. Severely Deaf:

   E IE OU E OU I A I E

4. Profoundly Deaf:

   LOUDsoft LOUD soft soft LOUD soft LOUDsoft

EXAMPLES OF MISTAKEN OR MISINTERPRETED WORDS:

Tub for Tug	Late for Lake	Tomb for Tuna
Change for Chain	Bride for Buy	Hide for High
Tray for Trade	Mouse for Mouth	Fort for Forth
Kettle for Cattle		

1. A student was asked what he would do if his *clothes* were on fire. He said he would run. He thought he was being asked what he would do if he was *close* to a fire.
2. A student asked why people would want a *witch* for their birthday. He mistook the word witch for *wish*.
3. When a woman was asked if she had a *DC* license (a license for a car in Washington, D.C.), she said yes. She thought she was being asked if she had a *teaching* license.

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FAMILIAR SAYINGS
(Family Air Sangs)

1. Rocker buy bay bee inner tree hops.

2. Stinkers honkers sick spentz.

3. High pled jelly gents two thief lag.

4. Want a drain sit bores.

5. Butter laid den ever.

6. Up any shave sup any urn.

7. Ink odd weed rust.

8. A nap a lad hey key pa dock tray weigh.

9. Hulking coal Vasser Murry Holtz hole.

10. Ah waits beep a light.

Adapted from a list compiled by Deidre Jordan, University of California-Berkeley

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TRANSLATION FOR FAMILIAR SAYINGS

1. Rock-a-bye baby in the tree tops.

2. Sing a song of six pence.

3. I pledge allegiance to the flag.

4. When it rains it pours.

5. Better late than never.

6. A penny saved is a penny earned.

7. In God we trust.

8. An apple a day keeps the doctor away.

9. Old King Cole was a merry old soul.

10. Always be polite.

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TIPS FOR COMMUNICATING WITH PEOPLE WHO ARE HARD-OF-HEARING

People who are hard-of-hearing or deaf use many means of communication. Some use speech, others sign, and still others write. Some people will use a combination of all these. When communicating with a person who is either deaf or hard-of-hearing, follow these suggestions to help make yourself clear.

- Converse in a quiet environment with few distractions.
- Make sure the area in which you are communicating is well lit.
- Before beginning to speak, get the person's attention. Do this either by calling his or her name, tapping his or her shoulder, waving your hand or using some other visual signal.
- Speak clearly, but do not exaggerate your lip movements.
- Do not block your mouth while you are speaking. Do not eat, chew gum, or have anything else in your mouth.
- Look directly at the person you are speaking to and maintain eye contact. If you have to turn away, do not start speaking again until you are looking directly at the person.
- Use facial expressions and gestures to help the person understand. Point to an object you are describing or use some other visual aid when you can.
- If the person does not understand you, do not just repeat what you said. Rephrase it. Say it with different words.
- If you are in a group situation, only one person should talk at a time.
- If a person is wearing a hearing aid, do not assume he or she can understand your voice. The hearing aid may only be for environmental sounds like a loud yell, the telephone, or someone knocking at the door.
- The best and most important thing you can do is ask the person who is hard-of-hearing what you can do to improve the communication process. Remember, many people who have a hearing loss feel isolated and left out in social situations.

Information provided by:
Metro Regional Service Center for Hearing Impaired People
444 Lafayette Rd. St. Paul, MN 55155-3814
(612) 297-1316

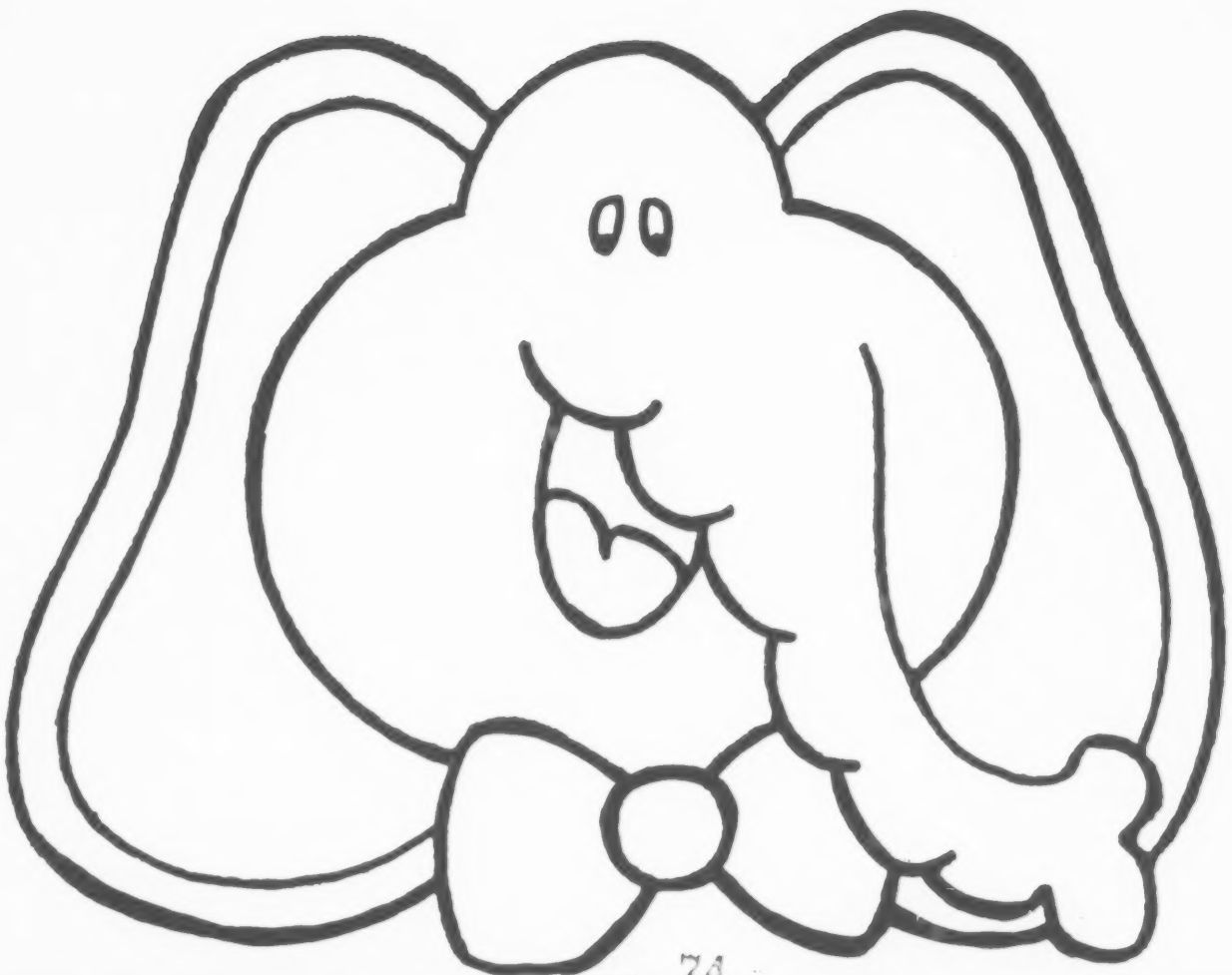
THE SOUNDS AROUND YOU

LISTENING AREA: _____

TEAM PARTNERS: _____

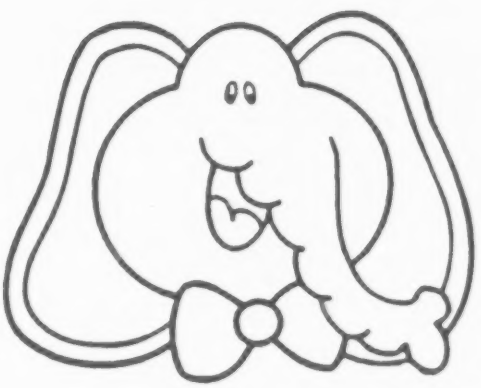
_____

Directions: Listen (for five minutes) to the sounds you hear in your listening area. With your partners, draw and/or write words in the elephant's ears to list the sounds you heard. Circle the sounds that you thought were loud.



PLAY IT BY EAR

SESSION 4



HEARING CONSERVATION CURRICULUM

SESSION FOUR

1. Introduction: Review of Assignment (Session Three)

Discuss "Sounds Around You" charts students made. Distinguish safe and unsafe sound levels.

2. Safe/Unsafe Noise Levels

*** Overhead: Elephant. Have class brainstorm other times of loud sounds.**

*** Overhead and Handout of "Noise is Around You If".**

*** Overhead and Handout of Sound Thermometer**

A moderate amount of loud sounds may first cause a temporary hearing loss. This often seems like fullness in the ear with muffled sounds, with a high pitched ringing in the ear. This ringing (tinnitus) is na'ure's way of warning that damage to the ear has happened. This feeling may last for several hours as the hair cells recover. It is important to note that once hair cells are hurt, they never fully recover. Repeated, prolonged and excessive exposure eventually will lead to permanent hearing loss.

*** Discuss OSHA and its role in setting safe and unsafe noise exposure times.**

The U.S. government, through the Occupational Safety and Health Administration, has determined maximum time limits that ears can be exposed to noise at decibel levels above 85 dB. Workers may not be exposed (unprotected) to noise at 90 dB for more than 8 hours in a 24-hour period. After that, for every 5 decibel increase, the exposure time is cut in half (95 dB for 4 hours, 100 dB for 2 hours, etc.).

Noise exposure is cumulative. This means the noise at home or at play and the loud sounds heard at work must be counted together in the total loud sounds heard during any one day.

*** Overhead and Handout of Sounds and Safe Exposure Times**

Some people believe they can toughen up their hearing against noise. This is absolutely not true. If people believe their ears have been toughened up against noise, they most likely have tuned it out mentally or their hearing has been damaged to the point where they no longer hear the noise as loudly as they had before. **(2)**

*** Class brainstorms solutions for dealing with loud sounds**

Hearing can be protected in a variety of ways:

1. Avoid situations of very loud sound.
2. Lower the volume of music or other sounds to prevent over-stimulation of the hair cells.
3. Reduce the amount of time exposed to loud sounds whenever possible.
4. Increase the distance from the source of loud sounds to reduce the amount of sound reaching the ear.
5. Take regular breaks from loud sounds or move into a quiet area to help the hair cells recover before they are damaged by over-stimulation. A good rule: Recovery time should be double the exposure time (a 60-minute break after 30 minutes of loud sounds).
6. Wear hearing protection (ear plugs or ear muffs) to reduce the amount of sound reaching the inner ear. **(2)**

3. Information/Demonstration of Earplugs

Ear protectors work by reducing the amount of sound that reaches the middle and inner ear. They come in two forms: ear plugs and ear muffs. Ear plugs are usually made of a dense foam rubber that can be inserted into the ear canal. Ear muffs cover the entire outer ear. When properly used, ear protectors have noise reduction ratings (NRR) of between 20 and 30 dB. When improperly inserted or used, they provide little or no protection. In general, ear muffs are better than ear plugs because they are easier to wear and cover the entire ear. Ear plugs are more comfortable, but more difficult to insert properly. **(2)**

Ear protection increases the amount of time a person can be exposed to noise. According to OSHA guidelines, people may be in an environment of 110 dB for only 30 minutes without protection. But if they are wearing ear plugs with a noise reduction rating of 20 dB, only 90 dB are reaching their middle and inner ear, so they are safe for 8 hours.

Certain materials will not work for ear plugs, including cotton and tissue paper, because they do not effectively block sound. (Cotton balls or tissue paper wads reduce noise only by approximately 7 dB.) Other materials, such as modeling clay and silly putty are not proper for ear plugs because they will not completely fill the ear canal or they may break off and get stuck in the ear canal. You should use only professionally manufactured ear plugs. **(2)**

Many rock band members have permanently damaged their hearing. Well-known rock musicians, including Rod Steward, Ted Nugent, Eddie Van Halen, and Pete Townshend, have publicly stated that they have hearing losses caused by loud sounds. Some rock band members now wear ear plugs to protect their hearing. They are still able to hear the other band members speak and play their music. It just sounds softer.

*** Demonstration/Handout/Ear Plugs: How to Insert and Use Foam Ear Plugs**

1. Make sure your hands are clean.
2. Hold the ear plug between your thumb and first two fingers. Slowly squeeze and roll the plug into a thin cylinder.
3. With your other hand, reach around behind your head and pull your outer ear upward and outward. This straightens out the ear canal.
4. Still squeezing the ear plug, push it into the ear canal.
5. Hold the plug in place with your fingertip as it slowly expands to fill the ear canal completely and block out sound.
6. If the plug falls out or is very loose, remove and repeat the steps. Squeeze the plug into a more narrow cylinder and insert it farther into the ear canal. Hold it firmly in place as it expands.
7. Ear plug will stay in place until you remove it.
8. When using hearing protectors, you will hear your own voice as louder and deeper. This is a sign that the hearing protectors are in correctly.
9. Disposable ear plugs may be reused by the same person until they become dirty or lose their elasticity.
10. A normal-hearing person wearing hearing protectors should be able to understand a regular conversation. **(2)**

Be sure to read aloud (to the class) the handout for parents with precautions regarding the ear plugs.

4. Closing: Summary of Session Four/Questions/Discussion

5. Questionnaire (Overheads)

6. Parent Letter, Earplugs, and Hearing Program Folder Sent Home

7. Assignment: Posters

Use large pieces of white tagboard cut in half. Have two or three students work together. Tell the students they are to create posters which warn others of the dangers of loud sounds and how to protect their ears and hearing. Tell them that all who finish their posters and do a good job will receive a reward. (Use Trend magnets, stickers, etc.) This assignment will be completed during art lesson time.

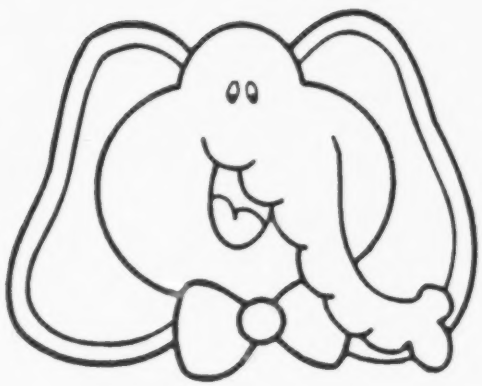
Supplementary Activity: Invite students to write to the Electronic Industries Association describing what they have learned. Each student who submits a letter to the association will receive either a four-color poster or a pin.

Electronic Industries Association
2001 Pennsylvania Avenue, NW
Washington, D.C. 20006

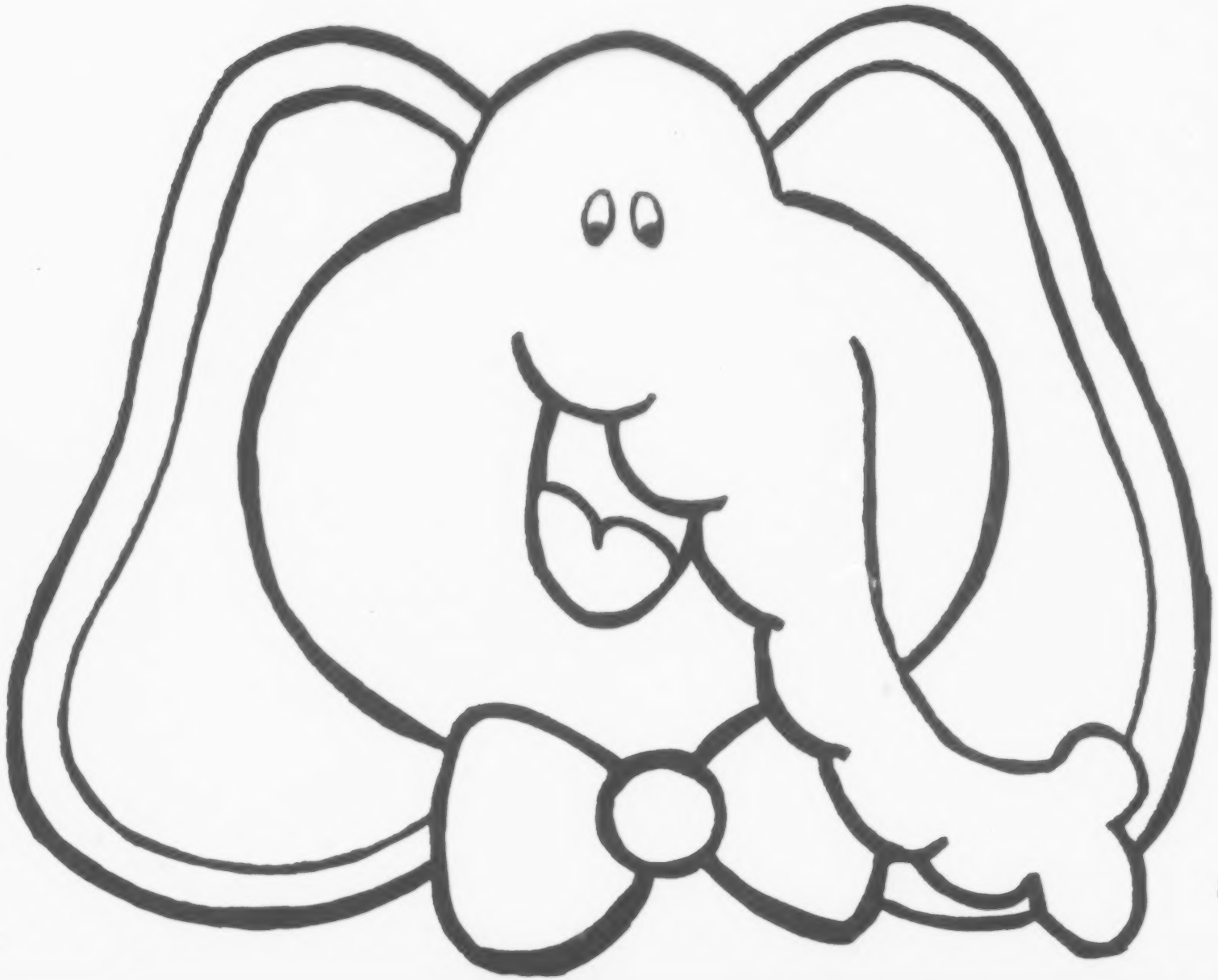
PLAY IT BY EAR

OVERHEADS

SESSION FOUR



THE SOUNDS AROUND YOU



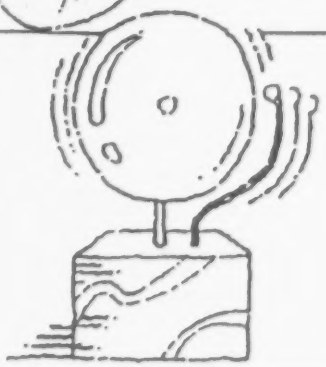
81

82

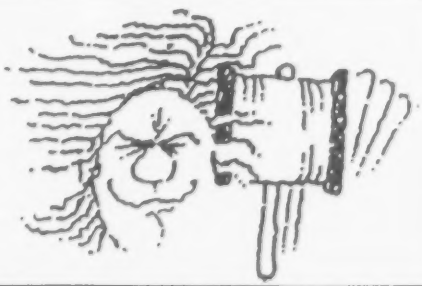
Noise is around you if:

A. You have to talk louder to be heard.

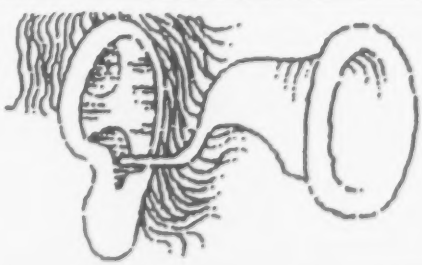
B. You hear buzzing or ringing after being around loud sounds; or if sounds make your ears hurt.



C. Sounds give you a headache.



D. Sounds make it hard to hear.



E. Sounds make you mad or sad.

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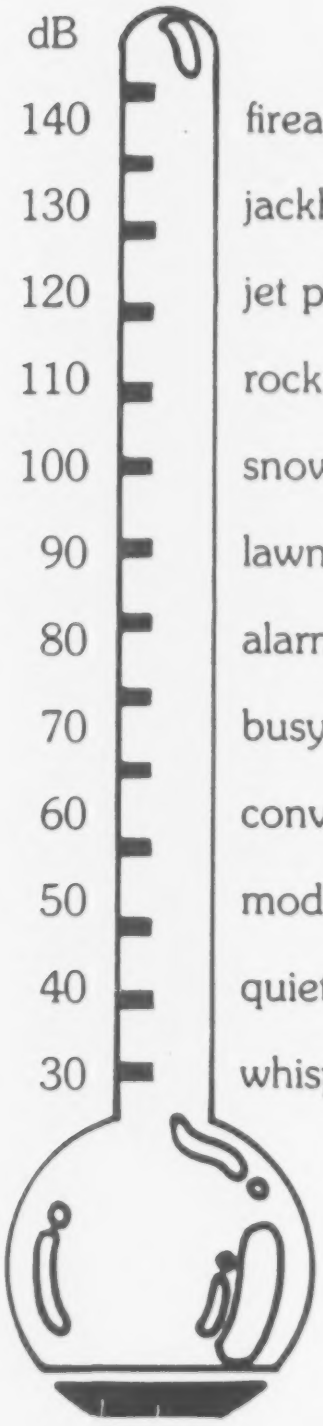
SOUND THERMOMETER



	dB	
Painful	140	firearms, air raid siren
	130	jackhammer
	120	jet plane takeoff
Extremely Loud	110	rock music
	100	snowmobile, chain saw
	90	lawnmower
Very Loud	80	alarm clock
	70	busy traffic, vacuum cleaner
	60	conversation, dishwasher
Moderate	50	moderate rainfall
	40	quiet room
Faint	30	whisper

S-1

American Speech-Language-Hearing Association
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SOUNDS AND SAFE EXPOSURE TIMES

0 Decibels	No danger at all	The tiniest sound most people can hear
10 Decibels	No danger at all	Quiet whisper
20 Decibels	No danger at all	Leaves rustling
30 Decibels	No danger at all	A quiet library
40 Decibels	No danger at all	Quiet classroom
50 Decibels	No danger at all	Birds chirping
60 Decibels	No danger at all	Normal talking
70 Decibels	No danger at all	A busy restaurant
80 Decibels	No danger at all	Heavy traffic
90 Decibels	Safe up to 8 hours per day Danger after 8 hours (Wear hearing protection)	Shop tools, Factory noise Lawn mower
100 Decibels	Safe up to 2 hours per day Danger after 2 hours without hearing protection!	Chain saw, Stereo head-phones at "6"
110 Decibels	Only safe for 30 minutes Danger after 30 minutes without hearing protection!	Pneumatic drill Snowmobile Car horn
120 Decibels	Only safe for 7 1/2 minutes Danger almost immediate without hearing protection!	Rock Concert Sand blasting Jet ski
140 Decibels	Immediate danger Maximum level allowed with hearing protection	Jet engine at takeoff Gun shot blast

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Dear Parent(s):

I am attaching a pair of foam ear plugs to protect your child from the dangers of loud sounds. For your information:

* Please look at the "Play It By Ear" hearing folder and the enclosed directions with your child before using these ear plugs.

* These ear plugs should not be shared with other family members.

* They should be placed only in the ear, NEVER IN THE MOUTH; therefore, please keep them out of the hands/mouths of younger children.

* These ear plugs should not be used to keep out water. They are only to be used in the presence of loud sounds to reduce the danger to your child's hearing.

If you have any questions/concerns, please contact me at 458-4260.

Dianne R. Olson, Speech/Language Clinician

HOW TO INSERT AND USE FOAM EAR PLUGS

1. MAKE SURE YOUR HANDS ARE CLEAN.
2. HOLD THE EAR PLUG BETWEEN YOUR THUMB AND FIRST TWO FINGERS. SLOWLY SQUEEZE AND ROLL THE PLUG INTO A THIN CYLINDER.
3. WITH YOUR OTHER HAND, REACH AROUND BEHIND YOUR HEAD AND PULL YOUR OUTER EAR UPWARD AND OUTWARD. THIS STRAIGHTENS OUT THE EAR CANAL.
4. STILL SQUEEZING THE EAR PLUG, PUSH IT INTO THE EAR CANAL.
5. HOLD THE PLUG IN PLACE WITH YOUR FINGERTIP AS IT SLOWLY EXPANDS TO FILL THE EAR CANAL COMPLETELY AND BLOCK OUT SOUND.
6. IF THE PLUG FALLS OUT OR IS VERY LOOSE, REMOVE AND REPEAT THE STEPS.
7. THE EAR PLUG WILL STAY IN PLACE UNTIL YOU REMOVE IT.

WHEN USING HEARING PROTECTORS, YOU WILL HEAR YOUR OWN VOICE AS LOUDER AND DEEPER. THIS IS A SIGN THAT THE HEARING PROTECTORS ARE IN CORRECTLY. A NORMAL-HEARING PERSON WEARING HEARING PROTECTORS SHOULD BE ABLE TO UNDERSTAND A REGULAR CONVERSATION.

DISPOSABLE EAR PLUGS MAY BE REUSED BY THE SAME PERSON UNTIL THEY BECOME DIRTY OR LOSE THEIR ELASTICITY.

CRESTVIEW ELEMENTARY SCHOOL
POST-PROGRAM HEARING QUESTIONNAIRE

NAME: _____

AGE: _____ **MALE ( )** **FEMALE ( )**

DATE: _____

EXPOSURE TO NOISE

1. Do you think it is important to be aware of the dangers of loud sounds?

   YES ( ) NO ( )

2. Do you plan to use earplugs to protect your hearing if you ever:

Attend Rock Concerts?	YES ( )	NO ( )
Attend Dances?	YES ( )	NO ( )
Ride a Snowmobile?	YES ( )	NO ( )
Ride a Motorcycle?	YES ( )	NO ( )
Ride a Jet Ski?	YES ( )	NO ( )
Use a Power Lawn Mower?	YES ( )	NO ( )
Use Firearms?	YES ( )	NO ( )
Use a Snowblower?	YES ( )	NO ( )
Use or Are Near Firecrackers?	YES ( )	NO ( )

3. Do you plan to turn down the volume on your "walkman", stereo ("box"), and TV set so that you do not damage your hearing? YES ( ) NO ( )

4. Do you plan to leave a loud dance or rock concert to go to the lobby or outside to give your ears a rest? YES ( ) NO ( )

POST-PROGRAM QUESTIONNAIRE
PAGE TWO (2)

5. Do you plan to share the hearing protection information you learned with your family? YES ( ) NO ( )

   If so, what will you tell them? _____

   _____

   _____

6. Do you think fourth grade is a good age to learn about the dangers of loud sounds? YES ( ) NO ( )

   If not, what age should people learn about loud sounds? _____

   Why? _____

7. Do you think this hearing information was helpful to you? YES ( ) NO ( )

   Why or why not? _____

   _____

8. What was your favorite part of the hearing program?

   _____

   _____

   _____

9. Are you now more aware of noise levels around you? YES ( ) NO ( )

10. What else would you like to learn about your hearing?

    _____

    _____

    _____

POST-PROGRAM QUESTIONNAIRE
PAGE THREE (3)

KNOWLEDGE OF HEARING AND HEARING LOSS

Circle the letter "T" if the statement is "True" or "F" if the statement is "False".

T F 1. A good way to protect your hearing from loud sounds is to put cotton in your ears.

T F 2. Hearing loss caused by too much loud noise can usually be corrected by a doctor's care.

T F 3. The volume of your "walkman" is too loud if someone next to you can hear the sound.

T F 4. One way to protect your hearing at a rock concert is to take a break in the lobby.

T F 5. A hearing aid returns hearing to normal just as eyeglasses return vision to normal.

T F 6. Ears can be "toughened up" against noise by increasing the volume levels on your stereo, "walkman", and TV set a little bit at a time.

T F 7. Loud noises can cause ringing in the ears.

T F 8. All words can be easily lipread by a person who has been trained to watch lips.

T F 9. Hearing loss caused by too much loud noise is always noticed immediately.

T F 10. The damage done by noise depends only on the loudness of the noise.

T F 11. The part of your ear that is hurt by noise is the eardrum.

T F 12. Rock music players never wear hearing protection because they would have trouble hearing other band members.

T F 13. Almost everyone in the United States loses some hearing as they get older.

T F 14. The government requires hearing protection for some workers.

POST-PROGRAM QUESTIONNAIRE
PAGE FOUR (4)

T F 15. The loudness of sound is usually measured in units called decibels.

T F 16. The inner ear controls our balance.

T F 17. The person who studies and tests hearing is an optometrist.

T F 18. Most hearing loss caused by too much noise can be prevented.

T F 19. Some animals can hear sounds that humans cannot hear.

T F 20. A machine used to test hearing is a sound meter.

Dear Parents:

Your child has recently completed a health unit entitled Play It By Ear, a hearing conservation program designed to alert fourth grade students to the dangers of loud sounds. In this unit, your child learned about the human ear and its parts, the causes of hearing loss, the measurement of hearing, the effects of noise on health and hearing, safe and unsafe noise levels, and good hearing health care.

Hearing loss affects approximately 28 million people in the United States. Approximately 10 million of these losses are at least partially caused by damage from exposure to loud sounds. Sounds that are sufficiently loud to damage sensitive inner ear structures can produce hearing loss that is not reversible by any presently available medical or surgical treatment.

Hearing impairment associated with noise exposure can occur at any age, including early infancy, and is often characterized by difficulty in understanding speech and the potentially troublesome symptom, tinnitus (ringing in the ears). Very loud sounds of short duration, such as an explosion or gunfire, can produce immediate, severe, and permanent loss of hearing. Longer exposure to less intense but still hazardous sounds, commonly found in the workplace or in certain leisure time activities, can produce a gradual loss of hearing sensitivity, initially without the victim's awareness. Sources of such sounds include live or recorded high-volume music, some recreational vehicles, such as snowmobiles and jet skis, power lawn mowers, and power tools such as chain saws.

Dr. James Snow, Director of the National Institute on Deafness, reported to the House Committee on Children, Youth and Families in July 1991 that we now know a shocking fact: **noise-induced hearing loss can begin between 10 and 20 years of age, much earlier than originally thought.** He further added: **"Just as parents require infant car seats, seat belts, protective goggles and helmets for their children, parents must also teach children to move away from intense noise and to make ear plugs and earmuffs a part of everyday life".**

Children are being exposed to noise in their home, school, and recreational activities to such a degree that they could begin losing their hearing at a far earlier age than you or your parents ever experienced. Please help educate your child about the importance of maintaining good hearing and the dangers of excessive noise. Ask about and discuss with your child their hearing program folder and what could be done to lessen the danger of loud sounds. (Attached to this letter is some information about noise and hearing that may help you in talking with your child.)

Please contact me if you have any concerns or want further information on how to protect your family's hearing.

Sincerely,

Dianne R. Olson
Speech/Language Clinician, Crestview School (458-4260)

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NOISE, HEARING, AND HEARING CONSERVATION
Fact Sheet

- Physically, there is no difference between sound and noise. Noise is defined as *unwanted sound*.
- If you are exposed to any loud sound long enough, it will begin to damage your hearing. It does not matter if you like or dislike the sound. (For example, Mozart at 120 decibels will damage hearing as quickly as Metallica at 120 decibels.)
- Excessive sound exposure damages hearing by over stimulating the tiny *hair cells* within the inner ear. There are between 15,000 and 20,000 of these microscopic sensory receptors in the snail-shaped *cochlea* (pronounced COKE-lee-ah). When these *hair cells* are damaged, they no longer transmit sound to the brain.
- Hearing damaged by noise is permanently lost and cannot be repaired. Hearing aids amplify sound for remaining hearing, but they do not fix hearing like eye glasses fix vision.
- *Noise-induced hearing loss* affects both the quantity and the quality of sound. Understanding human speech becomes difficult because words become indistinct. People sound like they are mumbling.
- Sound is measured in decibels, abbreviated dB. The capital B stands for Alexander Graham Bell.
- Some common sources of loud sounds include:

Truck traffic:	90 dB	Lawnmower:	90 dB
Chain saw:	100 dB	Car horn:	110 dB
Snowmobile:	100 dB	Baby's cry:	115 dB
Rock Concert:	115 – 120 dB	Farm implements:	90 – 110 dB
Firearms:	125 – 140 dB		

- Stereo headphones can emit sound as loud as 105 – 110 dB.
- Crowd noise at a professional sports event in a domed stadium can reach 115 – 120 dB.
- The maximum exposure time for unprotected ears per day at 90 dB is 8 hours. For every 5 dB increase in volume, the maximum exposure time is cut in half.

95 dB = 4 hours	100 dB = 2 hours
105 dB = 1 hour	110 dB = 30 minutes
115 dB = 15 minutes	120 dB = 7.5 minutes

- Hearing protection reduces the amount of sound reaching the inner ear. Ear plugs and ear muffs have *Noise Reduction Ratings* (NRR) from 15 to 30 decibels. This means that a person exposed to 120 dB while wearing ear plugs with a NRR of 20 dB would hear 100 dB (if the ear plugs are used properly).
- Cotton, tissue paper, modeling clay, or silly putty are not good ear protectors. They are too porous to block sound, or they may break off and get stuck in the ear canal.

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Regional Service Center

For Hearing Impaired People

NOISE AND HEARING PROTECTION

DID YOU KNOW

1. 40 million Americans work, play and live around environmental noise that is dangerously loud.
2. Many things that we find necessary, convenient or even enjoyable add to today's growing noise problem. These include: dishwashers, air conditioners, power tools, trucks, hair dryers, loud music, motorcycles, chain saws, guns, etc.
3. 10 million Americans suffer from hearing loss caused by noise where they work.
4. Noise induced hearing loss is a result of intensity (loudness) and duration of exposure.
5. About 23 million headsets (walkmans) and tape players (boom boxes) are sold in the U.S. every year. Studies have shown that sound levels from these machines can reach 115 decibels or more. At that level, permanent hearing loss could occur in just 15 minutes.
6. Noise induced hearing loss is permanent.
7. Noise induced hearing loss is painless and develops slowly.
8. Medicine or surgery will not cure noise induced hearing loss.
9. Ringing in the ears, headaches, temporary difficulty hearing and pain in the ears are some of the side effects of excessive noise.
10. Noise may produce high blood pressure, faster heart rates and increased adrenaline. Noise may contribute to heart and circulatory disease.
11. Hearing conservation programs are recommended for all employees in work places where noise levels are 85 decibels or greater.
12. Hearing loss will occur in 20-25% of workers exposed to the allowable limit of 90 decibels for 8 hours a day (the loudness of street traffic or a heavy-duty truck).

WHAT TO DO

1. Individuals exposed to loud noise for prolonged periods of time may be able to avoid permanent hearing loss by wearing ear protection.
2. Noise can be reduced in factories by barrier walls, acoustical tiles, vibration reducing equipment mounts, mufflers, and sound absorbing hoods.
3. In offices, drapes and carpets can help absorb sound and reduce noise.

Metropolitan Regional Service Center for Deaf and Hard of Hearing People
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PLAY IT BY EAR

HEARING CONSERVATION CURRICULUM

TEACHER EVALUATION

Teacher: _____ **Date:** _____

1. Was Play It By Ear effective in informing your students about their ears and hearing?

   1 = not effective 4 = highly effective

   1 2 3 4

2. Was Play It By Ear effective in motivating your students to protect their ears and hearing from loud sounds?

   1 2 3 4

3. Was Play It By Ear a good use of class time? **YES NO**

4. Was the content of Play It By Ear appropriate for fourth grade? **YES NO**

5. If appropriate inservice were provided, would you consider teaching this unit in your class?

   YES NO

   Why or Why Not? _____

   _____

6. What did you like best about this unit? _____

   _____

7. What were problems you found with this unit? _____

   _____

   Comments: _____

   _____

   _____

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Curriculum References and Sources

American Speech-Language-Hearing Association
10801 Rockville Pike
Rockville, Maryland 20852-3279

Metropolitan Regional Service Center for Deaf and Hard of Hearing People
444 Lafayette Road
St. Paul, Minnesota 55155-3814

National Information Center on Deafness
Gallaudet University
800 Florida Avenue NE
Washington, DC 20002-3695
"Have you ever wondered about . . . The Ear and Hearing," Evelyn Cherow, ASHA

New York League for the Hard of Hearing
71 West 23rd Street
New York, New York 10010
Video: "Stop That Noise", $39.95 + $5.00 S&H

Northern, J. L. & Downs, M. P. (1991). Hearing in Children. (Fourth Edition)
The Williams & Wilkens Publishing Company
428 East Preston Street
Baltimore, Maryland 21202

Sight & Hearing Association
674 Transfer Road
St. Paul, Minnesota 55114-1402
Complete "K*now* Noise" Curriculum including Video and Cassette Tapes, $89.00 + $6.00 S&H
Video Only: "K*now* Noise," $45.00 + $6.00 S&H
Audio Tape: Unfair Hearing Test, $7.00 + S&H
Text & Transparencies: $33.00 + S&H

WIDEX Hearing Aid Company, Inc.
35-53 24th Street
Long Island City, New York 11106

Please direct questions, comments, and suggestions regarding the Play It By Ear Hearing Conservation Program to:

Dianne R. Olson
3434 Oxford Circle
Woodbury, MN 55125